THE IRON TRADE REVIEW

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HEAVY BUYING

HAS NOT BEEN EQUAL TO REQUIREMENTS OF IRON MELTERS

And Demand for Pig is Very Strong—Tremendous Activity in Finished Materials Continues.

Additional evidence of the substantial character of the prevailing prosperity in the iron and steel business is furnished every day. Although melters of pig iron have been buying freely, it is certain that many will find that their contracts will not meet their requirements. Buyers desiring delivery this year, or the first three months of next year, find it very difficult to place orders, and in some cases very high prices are asked for prompt shipment. Reports from all iron centers show an advancing tendency, while many furnaces are slow to quote except in small lots to regular customers. It is confidently believed that the price of pig will go to nearly $20 before the end of the year. Although favored customers may obtain occasionally slightly lower quotations, $17.00 at valley furnaces is now the ordinary quotation for basic, Bessemer and No. 2 Foundry. Basic has been sold at $17.25 furnace for the first quarter of next year, although other sales are reported at somewhat lower figures. Southern pig iron is firmly established at $14.00 Birmingham. Southern and Central Ohio furnaces have advanced to the valley price of $17.00 for No. 2 Foundry. In the east the buying of pig iron has been rather light, the principal transaction being for 11,000 tons of basic for a New Jersey company.

There is an extremely strong demand for both iron and steel bars. Agricultural implement makers are specifying promptly. The demand for bars by car builders is tremendous. In Chicago market bar iron is selling from 1.80 to 1.85c, while at Youngstown 1.80c is asked.

Specifications for plates are very heavy, but in the east the demand is not so strong, and mills are glad to fill orders without premiums.

Deliveries on structural material are not now promised in less than six to eight months. The new structural mills at Clairton, Pa., and South Chicago, will be in operation in about two months, and each will have a capacity of about 10,000 tons a month.

The sheet situation is improving, and it is expected that prices will be advanced at a not far distant date. The market for wire and wire nails continues firm.

Owing to the several furnaces being out for repairs, there has been some coke available for pronipt shipment, and extremely high prices have not prevailed, but contract coke is strong.

The car shortage is becoming more serious and is causing much delay in the delivery of finished products as well as in handling the crude material.

LONG STRIKE ENDED

And Twentyeight Chicago Machine Shops Are Free—Other Labor News.

Officials of the machinists have officially declared off the strike they instituted in the spring of 1904, in twenty-eight machine shops of Chicago, which as a result of this action, have now become formally "open." The strikers, who numbered 2,000 when the strike was at its height, demanded the nine-hour day and increased wages. Wages range from 30 cents per hour up for skilled machinists and from 22½ to 27 cents per hour for "handy men." During the strike about 400 men were arrested and ten injunctions were issued against violence and picketing. At its close ninety machinists were out, and of these only fifty-five attended the meeting at which the vote was taken ending the struggle.

Union is Desperate.

The International Typographical Union at Peoria, Ill., under recent date sent out a circular to officers and members in which it says: "Unless money is forthcoming, the battle must be abandoned, and that means the disruption and disorganization of the book and job trade, long hours and the iniquitous open shop." The Superior Court of Grand Rapids, Mich., has granted a sweping injunction against the Typographical union of that city.

Union is Sued.

The International Association of Bridge & Structural Iron Workers and Frank M. Ryan, general president, has been sued for $50,000 damages by the Oscar Daniels Iron Works, Chicago. The sympathetic strike is attacked by the proceedings as it is charged that through the strike begun against the American Bridge Co., the Daniels firm was unable to secure non-union mechanics to take up heavy contracts which it had on hand.

Differences Settled.

The threatened strike, which would have involved about 7,000 men employed in the mines of the Rochester & Pittsurg, and of the Jefferson & Clearfield Coal & Coke Co., in Pennsylvania, has been avoided through a settlement of differences reached at a conference of miners and employers.

Better Satisfied.

The Standard Chain Co. is now operating all its plants, including that at Columbus, O. The interruption was caused by a strike of the employes, July 11. They are now under the open shop and declare themselves better satisfied than under the control of the Chainmakers' National Union.

The High House Coal & Coke Co., Uniontown, Pa., has decided to build an additional block of coke ovens in Southern Fayette county. Thomas F. Wiley is president of the company.

THE WEEK IN IRON CENTERS.

PITTSBURG.

Pig Iron Prices Higher—Heavy Business of Steel Car Building Companies.

OFFICE OF *The Iron Trade Review*,
521 PARK BUILDING, November 7.

The pig iron market has shown a sharp advancing tendency, with furnaces indisposed to sell at any price for the time being, but taking care of their regular customers on small lots, while on the other hand middlemen have done a relatively large business. There is every prospect that pig iron will be selling at between $18 and $20 at furnace before the end of the year, and that such high prices will be maintained at least through the period of bad weather, when operations, particularly the railroad movement, are more or less interfered with.

October was an excellent month for tonnage in finished material, as to both production and sales, and this month has opened up quite as well as regards sales. The demand for all classes of finished material is well nigh phenomenal, and it is worth mentioning again that the sales are of a vastly more substantial nature than used to be the case in the finished steel trade, the orders representing definite tonnages which the seller is satisfied the buyer will take out on time.

No large steel car orders have been taken since the second Pennsylvania and the New York Central orders, but the steel car plants are now filled up completely for about a year, or at least through the first three quarters of next year, although they are turning out about 225 steel cars every day, representing fully 2,500 tons daily of plates, shapes and axles, the standard cars requiring 15 tons or more of rolled material each, and the smaller cars a less tonnage.

The structural mills are not sold ahead on any large deliveries as far as the plate mills with their car business, but are sold up more solidly, there being actual specifications on their books, which buyers will take as fast as shipped, for all that can be rolled for the next four to six months. The new structural mill at Clairton will be completed and started some time in January, while the new structural mill at the South Works, Chicago, will be started a little earlier. These two mills will each have a capacity of something like 10,000 tons a month, and this will constitute a large addition to the structural shape production of the country, since the actual tonnage of regular structural shapes is hardly as large as generally rated. A large building nowadays, for instance, only involves about 60 per cent. of structural shapes, the balance being plates, etc., on account of the general use now of large plate girders and columns.

The car shortage has become a more serious matter. Shipments of many finished products is being seriously interfered with, and the accumulation at some mills has become so serious that unless there is early relief it will be necessary to close for short periods to work off the accumulations. The prospect is very unsatisfactory, considering the near approach of the bad weather, when railroad movement will naturally be more difficult than it is now.

Pig Iron.—Pig iron is very scarce, the furnaces being almost completely sold up for this year and having a large tonnage on books for the first quarter of next year. They fully expect much higher prices before the end of this year, and are accordingly indisposed to sell. The market is nominally $17.00, valley, for basic, Bessemer or No. 2 foundry, from the furnace standpoint, with furnaces occasionally making sales of small lots of No. 2 foundry at $16.50 to $16.75, furnace, to old customers. Middlemen have sold considerable tonnages of pig iron at lower than this price, but seem to be holding fairly well to it at present. We note sales of basic by several firms on Friday and Saturday of last week to one consumer, aggregating about 5,000 tons for first quarter, at a shade under $16.50, valley, or equal to about $17.25, delivered Pittsburg. We note sales of small lots of Bessemer this week at full $17.00, valley. A small open-hearth steel interest west of here is in the market for basic for second quarter, and will probably have to pay about $17.00, valley, for it. The market is somewhat uneven on account of so many producers refusing to quote at present.

Bessemer, Valley	$17.00 to $17.25
Bessemer, Pittsburg	17.85 to 16.10
No. 1 Foundry, Pittsburg	17.85 to 18.35
No. 2 Foundry, Pittsburg	17.35 to 17.85
Gray Forge, Pittsburg	16.85 to 17.35
Basic, Valley	16.75 to 17.00
Basic, Pittsburg	17.60 to 17.85

Ferro-Manganese.—The market is very firm, with very little ferro available. For any guaranteed early delivery prices are quoted at $65 to $67, delivered Pittsburg, while $65 might be shaded a trifle for delivery late next month. Reports are that the foreign producers are well sold up through the first quarter of next year, the probability being that something like the present high prices will prevail through that period, while for second quarter and later it is assumed that the market will ease up somewhat.

Billets.—Occasional sales are being made of billets and slabs at substantially the prices quoted last week, $26 for Bessemer billets and $27 to $28 for open-hearth billets. There is a little business doing in ingots at the usual spread. Sheet bars are nominally $27.

Muck Bars.—There is very little muck bar to be had, producers being so busy in their own finishing mills. There have been some tentative inquiries for large tonnages, but orders do not seem to have been placed. Some odd lots might be picked up at about $28.50, delivered Pittsburg, but some producers are quoting considerably higher than this.

Skelp.—The mills are very well sold up and can take on very little more tonnage for the next two or three months. Quotations are about a dollar a ton higher on sheared skelp, which is affected somewhat by the demand for narrow plates, while iron skelp is about $2.00 a ton higher, in sympathy with the sold-up condition of mills and the higher prices for other iron products. We revise quotations as follows:

Bessemer steel, grooved, 1.55c; sheared, 1.65c; open-hearth, grooved, 1.60c; sheared, 1.70c; iron, grooved, 1.70c to 1.75c; sheared, 1.75c to 1.80c.

Rails and Track Material.—Business in standard sections has been comparatively light the past fortnight. Light rails are very strong and active. The mills making light rails from new stock are booked for from two to three months ahead, and cannot take orders for earlier delivery, while the mills using old rails are hardly in position to sell very far ahead on account of the uncertainty in the raw material market. Ordinarily light rail orders would not be placed so far ahead, but are coming in freely at the present time. We quote prices on regular delivery unchanged, as follows, premiums being paid in

some instances to obtain earlier delivery of light rails:

Fifty pounds and heavier, 500-ton lots and over, $28; carload lots and less than 500 tons, $30; less than carload lots, $32; light rails, 16-lb., $29 to $30; 20-lb., $27.50 to $28; 25 to 45-lb., $26; angle bars for standard sections, 1.50c; spikes, $1.90 to $1.95.

Plates.—The last important steel car orders placed were those of the New York Central, aggregating 25,000 cars, and these, with the second order of the Pennsylvania railroad system, fill the steel car plants up into October or November of next year. The Pressed Steel Car Company is now making about 100 cars daily, the Standard Steel Car Company about 65, and the Cambria Steel Company and American Car and Foundry Company enough to bring the total to about 225 cars daily. The capacity of the Pressed Steel Car Company will be increased next year, and the Barney & Smith Car Company will build a plant for the manufacture of between 20 and 30 cars daily, so that by the middle or latter part of next year the steel car capacity of the country will be close to 300 cars daily. While this figure appears large, it should be noted that there are more than a million and a half wooden freight cars in the country, so that to replace them with steel cars, allowing for no increase in number, would require 20 years at the rate of 300 cars daily for 250 days each year. Deliveries of wide plates cannot be made within from two to four months; narrow plates can be had somewhat earlier. Premiums are being paid in some cases to Eastern mills to secure early delivery. Regular mill prices remain:

Tank plate, ¼ in. thick, 6¼ in. to 100 in., 1.60c f. o. b. mill Pittsburg. Extras are as follows per 100 lb.: Flange and boiler steel, 10c; marine, A. B. M. A. and ordinary fire box, 20c; still bottom, 30c; locomotive fire box, 50c; plates over 100 in. up to 110 in. in width, not less than 5c extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., not less than 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates, 125 in. to 130 in., not less than 50c extra; plates, 130 in. wide, not less than $1 extra; plates 3-16 in. thick, 10c extra; gauges 7 and 8, 15c extra; No. 9, 25c extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except Pacific Coast.

Merchant Bars.—Buying and specifying in merchant steel bars continues at a remarkable rate, the tonnage being as great as it was during October. Tonnage in hoops and bands is also very heavy. It is not likely that any change in prices will be made before the end of the year, although there has been a strong sentiment in some quarters favoring an advance for some time. Common iron bars are still firmer, and the general quotation is now the same as the leading interest has named for some time, 1.80c, Youngstown, or 1.85c, Pittsburg. A little tonnage might be picked up here and there at a dollar a ton less, but not much. The mills are all sold for two or three months ahead and are not anxious to take on more tonnage at this time, particularly on account of the uncertainty of the scrap market. We quote iron bars in general $1.00 a ton higher, and steel merchant mill products unchanged, as follows:

Common iron bars, 1.80c, Youngstown; 1.85c Pittsburg; hoops, 1.75c, and bands, 1.50c; taking hoop and band extras, respectively. Bessemer steel bars, 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c, net; channels, angles, zees and tees under 3 in., 1.60c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 lb., 10c advance; less than 1,000 lb. of a size, 30c advance.

Structural Material.—Tonnage continues to be very heavy, specifications being received very freely. The new structural mill at the Clairton Steel Works will be completed some time in January, and will contribute about 10,000 tons monthly to the structural supply. The new mill of the Illinois Steel Company will be completed about the same time, or a little earlier, and will have about the same capacity. Its completion will somewhat relieve the local mill, which has been doing some work which ought to go to Chicago. There is less demand now for prompt shapes for special outside jobs, and premiums are not so heavy. Regular mill prices are unchanged, as follows:

Beams and channels, 15 in. and under, 1.70c; over 15 in., 1.80c; zees, 1.70c; tees, 1.75c; angles, from 3 to 8 in., inclusive, 1.70c; universal and sheared plate, 6¼ in. and wider, 1.60c, base.

Pipes and Tubes.—Demand continues very good for merchant pipe, and a little more line pipe business has been done. There are some prospects of an official advance in prices, as the independent mills have been filled up for some time and the leading interest is booking a large tonnage. Nothing definite can be said about any advance, however.

We quote discounts in car lots to consumers as follows, prices to large jobbers being one point lower:

	Steel		Iron	
Consumers' Carloads	Black	Galv.	Black	Galv.
⅛ and ¼ inch	71	55	68½	52½
⅜ and ½ inch	75	63	72½	60½
¾ to 6 inches	79	69	77	67
7 to 12 inches	74	59	72	56½
EXTRA STRONG PLAIN ENDS.				
⅛ to ¾ inch	64	52	61½	49½
½ to 4 inches	71	59	68½	56½
4½ to 8 inches	67	55	64½	52½
Double extra strong plain ends, ½ to 8 inches	69	49	75½	43½

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

	Steel	Iron
1 to 1½ inches	44	41
1¾ to 2¼ inches	56	41
2½ inches	58	46
2¾ to 5 inches	64	53
6 to 13 inches	56	41

Less than carloads, two points less.

Sheets.—There is expectation that prices on sheets will be advanced at any time. Such an advance would not be in the official price, which nominally remains at 2.40c for black and 3.45c for galvanized, No. 28 gauge. The actual market has been, with the extreme rebate, 2.20c on black on large contracts. Until a few weeks ago there were concessions, in special cases, even from this price, but lately the minimum of the market has been squarely at this figure, while single carloads have been going at 2.25c and 2.30c. At the present time, while the leading interest has not changed its prices, there are very few independent mills which will accept business at 2.20c, and a number will not do 2.25c, even on the most desirable orders. On special sheets the market is particularly firm, various grades of extra sheets being at 2.25c and 2.30c bid, with the full extras added. The leading interest is running about 90 per cent. of its sheet capacity, which is practically full, as some capacity is almost always off from various contingencies. We quote the absolute minimum of the market at 2.20c for black and 3.25c for galvanized, with ordinary lots down to single carloads going at $1.00 to $2.00 a ton higher.

We quote the official prices as follows, these being quite nominal but well representing the differentials between gauges:

No. 30, 2.65c; No. 29, 2.55c; No. 28, 2.40c; No. 27, 2.30c; Nos. 25-26, 2.25c; Nos. 22-24, 2.20c; Nos. 17-21, 2.15c; Nos. 15-16, 2.10c; Nos. 13-14, 2.05c; Nos. 10-12, 2c. Galvanized, Nos. 10-11, 2.35c; Nos. 12-14, 2.45c; Nos. 15-16, 2.55c; Nos. 17-21, 2.70c; Nos. 22-24, 2.85c; Nos. 25-26, 3.05c; No. 27, 3.25c; No. 28, 3.45c; No. 29, 3.70c; No. 30, 3.95c.

Quotations f. o. b. Pittsburg, 30 days net, 2 per cent off cash 10 days.

Wire and Wire Nails.—The market continues firm, there being very little shading, even in the regular competitive districts. Tonnage is excellent, some mills making records for shipments, although car supply is rather unsatisfactory. Jobbers have been specifying very freely, as they fear trouble in transportation later. We quote prices as follows:

Wire nails, jobbers' carload lots, $1.80; retailers' carload lots, $1.85, and less than carloads, $1.95; painted barb wire, $1.95 for jobbers in carloads; retailers' carloads, $2, and less than carloads, $2.10, with 30c for galvanizing. Annealed smooth fence wire is held at $1.65, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 per cent. discount for cash in 10 days. Iron and steel cut nails, $1.70 to $1.75.

Merchant Steel.—The market is in good shape, producers being well sold up for about three months ahead and not actively soliciting business. New business is coming in at a satisfactory rate nevertheless, and specifications are good on old contracts. We continue to quote prices as follows:

Cold rolled and ground shafting, 50 per cent. off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.70c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.70c to 1.75c; toe calk, 2c to 2.05c.

Old Material.—The market is very firm. Sales to consumers are not heavy, but dealers are actively bidding for material, and in some cases offering about the same prices as have lately prevailed for delivery to consumers, which points to further advances. It is reported that the Carnegie Steel Company is to receive some large shipments of heavy melting scrap from the Illinois Steel Company, material which that company usually sells in its own local market. We quote prices unchanged, as follows, in gross tons, delivered Pittsburg district:

Heavy melting stock, $17.00 to $17.50; old steel rails, long lengths, $17.50 to $18.00; No. 1 cast scrap, $16.00; cast iron borings, $10.25 to $10.75, the latter for heavy borings; bundled sheet scrap, $14.50 to $15.00; No. 1 wrought scrap, $20.00 to $20.50; low phosphorous scrap, $20 to $21.

Coke.—Owing to two or three merchant furnaces, tributary to the Connellsville region, being out for repairs, there is a little coke to spare for prompt shipment, and fancy prices have disappeared, but contract coke is as strong as ever, with some interests not yet covered and there being doubt whether coke enough can be found. We quote strictly Connellsville furnace coke at $3.00 on contract for all or any part of next year, and prompt coke at $3.05 to $3.10. Strictly Connellsville 72-hour foundry coke is $3.50 to $4.00. Production in the standard Connellsville region in the week ending October 28 is estimated at 276,329 tons, a gain of about 2,000 tons over the previous week, and in the lower Connellsville region at 89,846 tons, a gain of nearly 1,000 tons.

Abendroth Bros., Port Chester, N. Y., have completed a new foundry building, 200 feet long and 150 wide, and are at present erecting a machine shop of similar dimensions. The new building will be fitted with electric traveling cranes and all the latest improvements.

A receiver was appointed on Nov. 6, for the Field-Evans Iron Co., to settle a dispute between the stockholders of the company. All creditors have been satisfied.

CINCINNATI.

Southern No. 2 Is Finally Established at $14, Birmingham.

November 7.

Pig Iron.—The market continues firm and southern No. 2 Foundry is now firmly established at $14.00 Birmingham. Southern Ohio furnaces are mainly asking $17.00 furnace for No. 2, but we hear of occasional sales of $16.75. Eight percent silicon is quoted at $19.00 to $19.50 Ohio furnace and southern car wheel $17.00 to $17.50 Birmingham. Gray forge has attracted considerable attention with sales at $12.50 to $12.75 Birmingham. Several large inquiries are in the market for basic and Bessemer with selling agencies unable to quote on the entire tonange. Cast iron pipe makers continue heavy buyers of foundry grades. Virginia furnaces are still maintaining $15.50 at furnace for No. 2 Foundry as a basis and are so well sold up on some grades that all agencies have been instructed not to accept any orders without confirmation. The belief is general in the trade that buyers are fairly well covered for the first half of next year but it is known that a number of large consumers have not provided for their wants. It is also currently accepted that with the orders booked and the demand now in sight production to July 1, 1906, will be taken care of. It is intimated that buyers have in some instances bought more than their requirements which has aided in advancing prices. The situation is apparently stronger, now than at any time since July. There is but little talk, however, of higher prices for southern iron at this time, and it is suggested that southern interests might not favor a further important advance in prices as contracts for coke and miners' wages are on a sliding scale with pig iron prices and with a number of low price contracts yet to be worked out this increased cost would tend to reduce profits.

While some of the southern furnaces that have been out of the market are now quietly taking orders for regular customers at $14.00 Birmingham, some important interests are refusing to offer anything. We quote f. o. b. Cincinnati as follows:

Southern Foundry No. 1	$ 17.25
Southern Foundry No. 2	16.75
Southern Foundry No. 3	16.25
Southern Foundry No. 4	15.75
Southern Foundry No. 1, soft	17.25
Southern Foundry No. 2, soft	16.75
Gray Forge	15.25 to 15.50
Northern Foundry No. 1	18.40 to 18.65
Northern Foundry No. 2	17.90 to 18.15
Northern Foundry No. 3	17.40 to 17.65
Jackson County Silvery, 8 percent	20.15 to 20.65
Southern Charcoal	19.75 to 20.25

Finished Material.—The market remains firm and jobbers report continued difficulty in getting mill shipments forward. Prices are well maintained and bar iron of itself is exceedingly firm, but is held at unchanged quotations to keep it in line with prices for steel. Bar iron is quoted at 1.70c to 1.75c; steel bars at 1.63c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets No. 10 and No 12, in car lots are 2.48c. We quote black sheets, No. 27, at 2.30c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.20c; No. 14, 2.10c; No. 12, 2c. Tank plates are firm and sell out of store at 2c for ¼-in. and 2.10c for 3-16, Nos. 8 and 10. Beams and channels are quoted at 2.25c to 2.50c from stock and angles at 2c to 2.05c for base sizes.

In merchant pipe a stronger tone prevails and some independent mills have advanced quotations above the schedule of the leading interests. Demand is heavier. We quote f. o. b. Cincinnati:

MERCHANT PIPE.

(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛ and ¼ inches	69.7	53.7	67.2	51.2
⅜ and ½ inches		61.7	71.2	59.2
¾ to 6 inches			75.7	65.7
7 to 12 inches			60.7	55.2

Coke.—The market continues firm with a tendency toward higher prices. Some fears are expressed that spot coke may become so scarce as to bring about some extreme quotations during the winter. We hear of one furnace contract covering the entire year, 1906, at $3.00 f. o. b. Connellsville. New River foundry coke is quoted at $3.60 to $4.00 f. o. b. ovens. Many of the coke producing interests are declining to make quotations for next year. One quotation on Connellsville foundry coke was at $3.75 for a contract covering the entire year, 1906. Inquiry for spot coke is good and offerings limited. Prices in the various coke-producing districts are as follows:

†Wise County, Va. Furnace Coke prompt shipment.	$ 3.00 per ton
Wise County, Va. Foundry Coke prompt shipment.	4.00 per ton
Pocahontas Furnace Coke on contracts	
Pocahontas Foundry Coke on contracts	
Connellsville Furnace Coke prompt shipment	3.25 to 3.50 per ton
Connellsville Foundry Coke prompt shipment	3 90 to 4.25 per ton
New River Foundry Coke on contracts	3 60 to 4.00 per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.65 per ton on $9.00 pig iron, plus 17 percent of the advance on pig iron above $9.00 Birmingham.

Old Material.—The market continues strong with buying for investment by dealers, the principal feature. We quote f. o. b. Cincinnati:

Old No. 1 railroad wrought, net tons	$17.50 to 18.00
Cast machine and foundry, net tons	14.00 to 14.50
Old iron rails, gross tons	23.00 to 23.50
Old steel rails, gross tons	16.50 to 17.00
Old short lengths, gross tons	17.50 to 18.00
Old iron axles, net tons	23.50 to 24.00
Stove plate, net tons	10.50 to 11.00
Wrought turnings, net tons	11.00 to 12.00
Cast borings, net tons	9.00 to 9.50
Car wheels, net tons	16.50 to 17.00

PHILADELPHIA.

Pig Iron Prices Advancing and the Demand Continues Heavy.

November 7.

Pig Iron.—Higher prices for coke and iron ore, embarrassing car shortages, and the generally prosperous business conditions are sending pig iron prices up in a way that makes $20 iron seem a much nearer probability than it did a few weeks ago. With $18.25 for No. 2 X foundry as the basis for the market, producers are holding very stiffly to their figures, and in many instances refuse to give quotations. The demand continues very heavy, and the railroads are making the situation still worse by their lack of transportation facilities. A furnace in interior Pennsylvania reports 9,000 tons of pig iron on hand, all sold and with customers clamoring for it, but which cannot be moved for lack of cars. Undoubtedly the fear of very serious transportation difficulties when snow and ice are added to the other embarrassments of the railroads, is having a large influence in creating the present urgent demand. Prices which show an advance of about 50 cents a ton, are quoted as follows:

No 1X Foundry	$18.50 to 18.75
No. 2X Foundry	18.25 to 18.50
No. 2 Plain	17.50 to 18.00
Standard Gray Forge	16.25 to 16.75
Basic	17.50 to 18.00
Low Phosphorus	23.00 to 24.00
Southern No. 2X, rail	17.75 to 18.00
Southern No. 2X, dock	17.25 to 17.50

Finished Material.

It is the old story from the mills, big demand and prices firm, with premiums for reasonably prompt delivery. No special change is to be noted and prices may be quoted as last week. Beams, channels and angles, according to specifications, 1.82½c to 2.50c; refined iron bars 1.63½c to 1.80c; steel bars, 1.63½c to 1.83c; plates, 1.73½c to 1.80c.

Old Material.—The scrap market continues very strong with an advancing tendency. Old steel rails are up $1 a ton, and steel scrap is in greater demand. The following figures show a few advances:

Old steel rails	$18.00 to 19.00
No. 1 steel scrap	18.00 to 18.50
Old steel axles	21.50 to 22.00
Old iron axles	27.50 to 28.50
Old iron rails	23.00 to 24.00
Old car wheels	16.75 to 17.50
Choice scrap, R. R. No. 1 wrought	22.50 to 23.50
No. 1 yard scrap	19.25 to 20.00
Machinery scrap	16.00 to 16.75
Low phosphorus scrap	21.50 to 22.50
Wrought iron pipe	16.50 to 17.00
No. 1 forge fire scrap	16.50 to 17.00
No. 2 forge fire scrap, ordinary	13.50 to 14.00
Wrought turnings	14.50 to 15.00
Axle turnings, heavy	15.50 to 16.00
Cast borings	10.25 to 10.75
Stove plates	13.00 to 13.50

CLEVELAND.

Ore Shipments to Date Exceed Those of Any Entire Previous Year—Pig Iron Firm.

OFFICE OF *The Iron Trade Review*,
Browning Building, November 7.

Iron Ore.—Shipments of ore from upper lake ports for October were 4,257,009 tons against 4,034,721 tons in October, 1904. For the season to Nov. 1, the shipments this year were 29,730,615 tons. The highest shipments ever made for an entire season were 27,571,121 tons in 1902. Last year 3,500,000 tons were moved after Nov. 1, and with the same movement this year, the total for the entire season of 1905 will exceed 33,000,000 tons. In spite of this record breaking amount all the ore sold, including, of course, that of the producing-consuming interests, will not be shipped, as the sales have amounted to nearly 36,000,000 tons. The shipments by ports were as follows:

	Oct. 1904.	Oct. 1905.	To Nov. 1, 1904.	To Nov. 1, 1905.
Escanaba	659,286	620,567	2,951,532	4,545,922
Gladstone			480	
Marquette	370,638	371,376	1,548,682	2,631,210
Ashland	470,505	447,580	1,902,236	3,033,774
Superior	799,221	707,629	3,482,255	4,574,407
Duluth	904,045	1,108,598	3,945,051	7,895,976
Two Harbors	831,026	1,001,259	3,826,523	7,049,326
	4,034,721	4,257,009	17,657,159	29,730,615
1905 Increase		222,288		12,073,456

Although one large company continues to sell ore at an advance of only 25 cents per ton over quotations of last year, other interests have not yet entered the market, and when they do, they will probably ask an advance of 50 cents. If present conditions continue, they will experience little difficulty in making contracts at that advance. It is expected that the higher prices of materials and other items will advance mining costs about 20 cents a ton next year, and in that event an advance of 50 cents would net the sellers only 30 cents more than they are getting this year. Furnace interests are inquiring for ore for next year, as they are anxious to know how to estimate the cost of making pig iron. There are also many inquiries from furnaces which will need ore to cover requirements up to the opening of navigation next year. Buyers of this class are finding much difficulty in placing their orders.

Pig Iron.—Prices are still tending upward. Basic has been sold at $17.25 valley for the first quarter for next year. The usual quotations on foundry grades are based on $17.00 at the valley furnace, and foundrymen are finding difficulty in buying any iron for this year's delivery, except at fancy prices. The foundries are extremely busy and there is a scarcity of molders. We quote f. o. b. Cleveland as follows:

Bessemer	$17 85 to 16 10
No. 1 Foundry	18 00 to 18 50
No. 2 Foundry	17 35 to 17 75
No. 3 Foundry	16.50 to 16 75
No. 2 Southern	17.35 to 17 85
Gray Forge	16.00 to 16.50
Gray Forge, Southern	15 75 to 16 25
Lake Superior charcoal	18.00 to 18.50

Finished Material.—Deliveries of structural material are seldom promised now for less than six to eight months, and the demand continues very strong. There is considerable irregularity in prices on sheets, shafting and boiler tubes. Bar iron is firm and, in spite of low quotations made by Indiana interests, as high as 1.80c Youngstown has been asked. Although many consumers of steel bars have provided for their requirements by contracts, there is still a good demand. Jobbers' prices for bar iron out of stock have been 1.80c to 1.85c, but will probably be advanced at an early date.

Old Material.—The market continues strong with prices firm and advancing in steel boiler plate and heavy steel Trading is brisk, though not extremely heavy. We quote, Cleveland delivery, as follows:

Old iron rails	$23.50 to 24.50
Old steel rails (over 6 feet)	16.00 to 17.00
Old steel rails (under 6 feet)	17.00 to 18.00
Old car wheels	16.00 to 16.50
Steel boiler plate	14.00 to 15.00
Steel axles	20.00 to 21.00
Malleable iron (railroad)	16.00 to 17.00
Malleable iron (agricultural)	15.00 to 16.00
Heavy steel	16.50 to 17.00

We quote as follows, net tons:

No. 1 R. R. wrought	17.50 to 18.00
No. 1 busheling	14.00 to 15.00
No. 1 machine cast	13.75 to 14.25
Iron axles	22.50 to 23.50
Axle turnings	11.50 to 12.50
Wrought turnings (free from cast)	11.00 to 12.00
Grate bars	9.00 to 9.50
Pipes and flues	13.00 to 14.00
Tank iron	11.00 to 11.50
Hoop and band iron	8.00 to 9.00
Sheet iron	7.00 to 8.00
Wrought drillings	11.00 to 12.00
Stove plate	10.50 to 11.00
Cast borings	8.50 to 9.50

Metal Trades Dinner.—The Worcester Metal Trades Association, Worcester, Mass., is to hold its fall dinner at the State Mutual Restaurant, Nov. 14. The speakers will be Thos. E. Durban, general manager of the Erie City Iron Works, Erie Pa., who will recount his experiences with organized labor, L. B. Burlingame, of the Brown & Sharpe Mfg. Co., Providence, R. I., with the subject of "Apprentices," and H. D. Barker, treasurer of the Maynard-Gough Co., will speak on the local and national strike of the printers.

NEW YORK.

Pig Iron Market Strong, But Actual Buying is Limited.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., November 7.

Pig Iron.—While the local market has been full of reports concerning heavy purchasing elsewhere, actual sales affecting this locality have been comparatively few. The total will probably not exceed twenty or thirty thousand tons, made up of small lots of foundry and other grades. There has been considerable "up-state" business consisting of foundry, basic and malleable, some 15,000 tons having been taken by consumers in New York state and Connecticut. Probably the most extensive single sale of the week was that of 11,000 tons of basic divided into two lots, 5,000 and 6,000 tons respectively, which is to be shipped to the Passaic Steel Co., at Paterson, N. J. The requirements of the J. B. & J. M. Cornell Co., and the General Electric Co., noted last week, have been satisfied. There is a large volume of business to be placed before the end of the year, and prices are still tending upward. The following are prices at tidewater.

Northern No. 1 Foundry	$18 00 to 18.75
No. 2 Foundry	17.70 to 18.40
No. 2 Plain	17.00 to 17.50
No. 1 Southern Foundry	17.50 to 18.00
No. 2 Southern Foundry	17.25 to 17.75
No. 3 Southern Foundry	17.00 to 17.25
No. 4 Foundry	16.25 to 16.50

Pig Iron Certificates.—Trading in pig iron certificates on the New York Produce Exchange has been more active than during the weeks past, and prices have shown a marked advance. Warrants are now held on a basis of $14, Birmingham. A sale of 200 tons of the regular classification was effected on Monday at $17, spot. Foundry iron warrants follow:

	Bid.	Asked.
November		16.75
December		17.00
January	17.10	
February		17.10
March	17.20	

Finished Iron and Steel.—Efforts have been directed more toward making good on orders already on the books than towards the securing of new business. As compared with some weeks past transactions in rails and structural materials have been light during the week. The lull is due partly to the approach of election day, but probably more especialy to the continued difficulty of securing deliveries within reasonable time. Heavy tonnages required by the railroads and also in the building trade are still awaiting consideration. The activity in plates reported from interior points does not extend in a marked degree to local independent interests. One producer remarked, "If you hear of offers of premiums on plates, send them our way. We can take care of them without premiums to the extent of several thousand tons a month." The American Bridge Co. and other producers of structural material booked orders aggregating 20,000 tons partly for railway work and the remainder for buildings to be erected within the next few months. Purchase of rails mostly in small lots for distant lines and trolley roads bringing the total for the week to between 40,000 and 50,000 tons. Bar iron has been firm with a fair demand and moderate sales, and sheets have shown some improvement.

The following are prices at tidewater: Angles, 3 to 6 in. x ¼ in. and heavier, 1.84½c; beams, 3 to 15 in., 1.84½c; tees, 3 x ¼ in. and heavier, 1.89½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine and ordinary fire box, 1.94½c; refined iron bars, 1.79½c; soft steel bars, 1.64½c to 1.79c; sheets in carload lots New York, black 2.40c.

Old Materials.—Prices are firm throughout the list, and while it is known that large dealers are holding considerable stocks, it is not believed that values will be much if any lower. All indications favor an active demand for some time to come. There is a good demand for heavy melting steel scrap, but few holders are willing to sell at the present views of buyers. Sales of charging amounting to about 1,500 tons at $17.00 and $17.50 gross ton delivered were reported during the week. Of low phosphorus steel scrap 1,000 tons were sold at $21.50, gross, delivered, and 350 tons at $21.75 also delivered. A sale of 500 tons heavy section old

tee rails is reported at $18.00, gross, delivered at the buyers' mill. The following prices are f. o. b. approximately, at tidewater.

Old iron rails	$20.00 to 21.00
Old steel rails, long lengths	15.00 to 15.50
Old steel rails, short pieces	14.50 to 15.00
Relaying rails	22.50 to 23.00
Old car wheels	16.00 to 16.50
Old iron car axles	21.00 to 22.00
Old steel car axles	18.50 to 19.00
Heavy melting steel scrap	17.00 to 17.50
No. 1 railroad wrought scrap	18.00 to 19.00
Iron track scrap	17.50 to 18.00
Wrought pipe	12.00 to 13.00
Cast borings	10.00 to 10.25
Wrought turnings	14.50 to 15.50

BIRMINGHAM.

Birmingham, Ala., Nov. 6, 1906.—The feature of the Birmingham iron market is that more iron is being shipped out now than is being manufactured. The railroads are doing well in furnishing cars with which to handle the pig iron, and the outward movement is telling on the stacks of accumulated iron. A consumer desiring 15,000 tons of iron during the past week was able to find 1,000 tons delivery this year. The furnace companies in this district do not appear to be in a position to handle business, though quotations are improving, a few hundred tons lots, immediate delivery, having been sold recently as high as $14.50 per ton, No. 2, foundry.

The production in this district is holding its own. The Republic Iron & Steel Co. will be able to blow in its No. 1 furnace before the end of the year, while the Woodward Iron Co. expects to get the furnace now under repairs at its plant in operation before the middle of next month. The Tennessee Coal, Iron & Railroad Co. does not expect to get its Alice furnace in blast in this city before the middle of January, if by then. No. 6 furnace at Ensley, belonging to the Tennessee Coal, Iron & Railroad Co., is doing magnificently in the way of iron production. During the month of October that furnace produced 11,544 tons of iron, a daily average of 372 tons The No. 5 furnace, which is being rebuilt at Ensley, will have a similar output, it is expected.

The Metal Market.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., November 7.

Pig Tin.—Although the statistical statement for October was unfavorable, showing an increase in the visible supply, the price of tin held firm to the high figure attained last week. Domestic consumers bought small lots but showed little disposition to place orders for future shipment. Today's quotations follow. Spot 33.05c to 33.20c; November 32⅞c to 33⅛c; December, 32¾c to 33c; London, £150 7s 6d £149 15s. Arrivals for the month to date, 190; afloat, 2475 tons.

Copper.—There has been comparatively little buying during the week owing partly to the unwillingness of producers to sell in any but small quantities for this year's delivery. Today's closings follow: Lake and electrolytic, 16⅜c to 16⅝c; casting, 16⅛c to 16⅜c. London's closing today: £72 5s and £71 5s. Exports for the month to date, 971 tons.

J. M. Jack, general secretary of the Associated Ironmolders of Scotland, states that the total membership of the society is now 7,584, while the working membership stands at 5,821. The condition of the trade would, he believed, be better still if it were not for the prolongation of the patternmakers' dispute.

IMPORTANT DECISION.

Plan of Government on Contracts for Work on Panama Canal Announced.

WASHINGTON, Nov. 7.—The authoritative announcement that the United States Government will enter into contracts with corporations or individuals for the construction of the Panama canal or any part of it, for which a bidder may submit satisfactory proposals, is full of significance for machinery manufacturers, iron and steel men and firms in equipment and supply lines in general. It is well known that the conditions governing the sale of supplies to the government under strictly competitive conditions are not always the same as those prevailing when purchases are made by private contracting firms, some of which have more or less close relations with certain manufacturers or jobbers.

Thus far all purchases made for the canal work, and they have embraced everything from steam shovels to small hardware, have been made outright by the Canal Commission. This equipment has been obtained merely for what might be termed experimental work. It was necessary for the government officials to direct a certain amount of work, personally in order that they might obtain at first hand, definite knowledge as to the work to be performed and conditions in general which would enable them to pass intelligently upon bids submitted by prospective contractors and to draw up contracts that would cover all points. Now that this practical experience has been obtained, or bids fair to be in the near future. Plans are being made looking to the issuance of calls for bids and proposals will probably be invited soon after it is definitely determined what type of canal shall be constructed.

A number of firms have already given assurances that they will offer bids, among the number being the Atlantic, Gulf & Pacific Co., which is carrying out extensive harbor improvements at Manila and is building two large dredges for government work on the terminals of the canal. None of the prospective bidders have, however, stated that they will seek a contract for the entire project and there is growing doubt in government circles whether any private firm will be anxious to undertake the excavation of the Culebra cut. It is not that the work of excavation is so difficult, but the disposition of the excavated material presents problems which many contractors appear to regard as formidable

CINCINNATI'S INDUSTRIES INSPECTED.

Under the auspices of the Cincinnati Industrial Bureau, more than one hundred of Cincinnati's leading business men and manufacturers made a tour of inspection of some of the large manufacturing plants in and around Cincinnati, on Oct. 24.

Among the plants visited were the Addyston plant of the United States Cast Iron Pipe & Foundry Co., The American Laundry Machinery Co., The Smith & Nixon Piano Mfg. Co., and the Standard Mill Work Co.

Mr. S. P. Egan, of the J. A. Fay & Egan Co., was the chairman of the excursion committee. Mr. William Lodge, of the Lodge & Shipley Machine Tool Co., who is president of the Industrial Bureau, in an address made during the luncheon, which was served by the Foulds Milling Co., manufacturer of macaroni, outlined a plan for the formation of a company to assist in financing new industries which come there. The bureau, in its work, runs across many concerns which are willing to move, but they demand that additional capital be put into them. Many of these industries are worthy and excellent investments, and while the bureau has in the past abstained from this promoting feature, steps may be taken in the near future to see what can be done along this line.

PITTSBURGH FOUNDRYMEN'S ASSOCIATION

Discussion of Thermit Occupies Entire Meeting.

The entire session of the Pittsburg Foundrymen's Association on Monday night, November 6, was devoted to the subject of thermit, there being no regular or special business brought up.

Thermit is put on the market by the Goldschmidt Thermit Company, New York. A paper was presented by W. M. Carr, of the company, and some very interesting demonstrations were made by his assistant, showing the actual operation of the material in welding two pieces of pipe, piercing a boiler plate, and raising a girder rail section to the temperature necessary to make a complete weld of satisfactory electric conductivity. The reading of the paper was followed by the projection of lantern slides showing various operations conducted with thermit, together with reports of weld examinations.

Thermit is a mixture of ground aluminum and iron oxide. The principle of its use is bringing the heat to the material to be welded, rather than bringing the material to the heat. It is thus possible to save much time in cases where the dissembling of machinery would be tedious, as in the repair of broken locomotive frames, for instance. The material is combustible, but not explosive, and can be stored with safety indefinitely. The oxygen for combustion is furnished by the iron oxide, and not in any degree by the atmospheric air. The union of aluminum and oxide forms a slag, alumina, and the freed iron forms an iron product which is substantially wrought iron, the carbon and manganese being very low. Thermit is ignited by a temperature of 2500° F., produced by a small quantity of flash powder dropped on it, which is ignited by a match. The combustion proceeds regularly, but with great intensity, producing a temperature of about 5000° F., or appproximately that of the electric arc, or sufficient to fuse nearly all the metals.

After the combustion of thermit in a crucible the slag formed floats on the surface of the iron formed, being about one-half its specific gravity. For light welding the heat of the slag, which pours off first, is utilized.

The first demonstration consisted in welding two pieces of 2-inch pipe by means of slag. The thermit being placed in a crucible and ignited, an intense combustion ensued. The place to be welded being surrounded by a mold, the slag was poured into this mold, completely surrounding the pipe. The slag immediately solidifies, holding the metal in place, while the heat is amply sufficient to form a perfect weld. After a short interval the mold is removed, the slag is knocked off, having no tendency to adhere, and a perfect weld was exhibited.

Where a greater heat is desired than that furnished by the slag, and it may be desired also that some iron enter into the weld, a different application is made. The thermit is allowed to burn in a conical-shaped cupola, and when the plug is removed the steel or iron first flows down.

The second demonstration consisted in using thermit in this way, the stream of molten iron or steel being allowed to drop on a piece of boiler plate, which it penetrated, to all appearances, instantly, leaving a hole an inch or more in diameter.

For the use of thermit in this manner there are different compounds furnished, which produce different qualities of steel. The object in this case is to produce a steel of the requisite quality to actually enter into the weld and reinforce what would otherwise be a weak joint. In the case of cast iron, more thermit is required than for steel or wrought material. The conditions necessary to consider are a liability of shrinkage, strains manifesting themselves, and to permit the thermit steel to circulate within the mold space and wash away the glaze of graphitic carbon, which has a refractory effect.

The third demonstration was made with the conical cupola, the bottom plug being removed, allowing the thermit steel to enter a mold formed around a standard girder rail. The thermit steel, by its temperature, raises the ends of the rail section to the welding temperature, washes the surface, enters any openings, and finally surrounds the whole with a band of steel.

In gray iron practice, thermit is useful to assist in melting steel borings in small charges of metal. For this purpose thermit is supplied in small cans holding about 1½ pounds. The steel borings having been previously placed in the bottom of a ladle of molten metal, the can is plunged in and the combustion of the thermit immediately melts the borings and disseminates the steel through the whole mass.

A similar plan is followed in order to revive dull metal. Any desired amount of heat can be attained by regulating the quantity of thermit used.

A variety of thermit is made which permits of introducing titanium into molten cast iron. The titanium thermit is furnished in cartridges, which are plunged into ladles of cast iron at the end of a pole. The combustion immediately produces a titanium iron. The effect is a poling action, which, with the high temperature of the titanium iron, produces results in a thorough mixture of the titanium through the whole contents of the ladle. The action of the titanium is to absorb gases, and liquefies slags and oxides which are always more or less dissolved in molten pig iron, the metal itself being made more fluid.

Following the reading of the paper, a number of very interesting lantern slides were shown of various applications of thermit. A number of these showed the welding of electric railroad rails in this country and abroad. A continuous rail is produced, the joints being reinforced and being of excellent conductivity. Several views were given of the welding of stern posts of lake and ocean vessels. One of these welds was on a stern post 8x20 inches, which required 900 pounds of thermit. Another was of a propeller shaft 18x18 inches, which required 700 pounds.

The following members and visitors were present:

J. S. McDonald, Westinghouse Electric and Manufacturing Company.
Hunter Sleeth, Westinghouse Air Brake Company.
John Shick, Westinghouse Air Brake Company.
J. F. Brown, Mesta Machine Company.
S. B. Smith.
B. E. V. Luty, "Iron Trade Review."
W. J. Dorsey, Enterprise Foundry Company.
E. D. Frohman, S. Obermayer Company.
R. V. McMullen, Engineers' Society.
Mr. McEwan, A. Garrison Foundry Company.
Mr. Stark, A. Garrison Foundry Company.
Anton Lukaszewskee, Goldschmidt Thermit Company.
C. Mike.
Mr. Crawford.
Mr. Wright.
H. E. Field, Mackintosh, Hemphill & Co.
H. Horne, Mackintosh, Hemphill & Co.
H. Gulick, R. W. Hunt & Co.
Mr. Carr.
Wm. Yagle, Yagle Foundry and Machine Company.
James Kearns, Mesta Machine Company.
E. W. Swanson, Mesta Machine Company.
F. H. Johnson, Engineers' Society.
H. Penrose, L. & R. Wister & Co.
A. W. Slocum, Keystone Car Wheel Company.
B. D. Fuller, Westinghouse Electric and Manufacturing Company.
S. D. Sleeth, Westinghouse Air Brake Company.
J. W. Hetzel, C. G. Smith Company
J. H. Beam, Edgar Thomson Foundry Company.
James Fox, H. K. Porter Company
John H. Grunigle, Mesta Machine Company.

BRITISH EXCITEMENT PAST.

Iron and Steel Trade, However, Continues Strong with Higher Prices.

(Special Correspondence.)

BIRMINGHAM, ENG., Oct. 24.—For the time being the boom has spent itself, that is to say, the eager excitement which was such a feature of quarter-day has passed away. This stage was anticipated and was spoken of as the real testing time, when reductions were not at all beyond the range of possibility. But they have not arrived and the more solid condition of trade is still marked by steady upward progress. Pig users are not now so disposed to buy forward, having for the time being satisfied their needs. But sellers, on the other hand, are still less disposed for future contracts, having work in all cases to the end of the year and in many instances up to March. There are prophets who expect to see Derbyshire and North Staffordshire brands of forge pig up to £3 by the end of the year. At present they stand at £2 13s 6d to £2 15s. The prediction is not unlikely to be fulfilled. The most important increase on Thursday was the rise of 10 in. galvanized sheets making the standard f. o. b. Liverpool £11 15d. But again, this has been passed, sheets selling by the best houses at £12 5s. But the rise in the standard represents £1 15s since its commencement in March last. Sales in this line continue to distance all past records. Galvanized hollowware, a kindred industry, has had another advance, largely owing to dear spelter and the demand for best buckets, and is 5 percent dearer. This is the third advance of the kind in six weeks. From various directions comes news of increased output. Thus, Messrs. Sankey & Sons have just restarted the Manor Works of Ettinghshall, an establishment which has been idle for some years. Sir Alfred Hickman whose Springvale furnaces have for years had a wonderful run of prosperity, is starting another steel furnace. In all directions, makers are looking around for means of increasing their output. Unhappily, some of the men are not using their prosperity wisely and several local firms have recently obtained damages from their men for neglect of work.

This week Messrs. Hope & Son, of Birmingham, have opened new works at Smethwick, occupying three acres, for the manufacture of light steel construction work, steel sashes, and heating apparatus. This is really an outgrowth from the city, of which we had many examples lately, many firms finding it advantageous, especially from the point of view of rating economy, to get a little farther away from Birmingham.

Wayne Wills, formerly assistant to the president of the Republic Iron & Steel Co., has resigned, and the office has been abolished.

H. F. Crandall, superintendent of the Milwaukee Works of the International Harvester Co.; E. J. Birkett, master mechanic of the same plant; Robert Anderson, chief engineer; William Riley, foundry foreman, and William Zachow, chief draftsman, all connected in the capacities mentioned with the same works, have resigned to accept similar positions with the J. I. Case Threshing Machine Co., Racine, Wis. The cause for the exodus of these men was due to the appointment of G. H. Schulte, formerly general manager of the Milwaukee Harvester Co., under whom all of them had worked for periods ranging from fifteen to twenty years, to a similar position with the Racine firm.

OLD SAGINAW MINE

Will Be Thoroughly Explored—May Become a Large and Profitable Producer.

(Special Correspondence.)

IRON MOUNTAIN, MICH., Nov. 7.—John T. Jones and associates of this city are determined to be shown what they have in the old Saginaw, where they have recently cut a fine-looking deposite of iron ore. They have engaged Longyear & Hodge, expert diamond drill contractors, to cut the formation with holes and prove the deposite at depth, and the work is to start at once.

The Saginaw is in the Norway district, and when Mr. Jones took it over he did so with the idea of mining out the pillars in the old workings and a small deposit of ore that had recently been uncovered. In preparation for this it was decided to do some exploratory work in a part of the ground that had been considered worthless and had never been touched, and it was in this ground that the new deposit was encountered, and at about the time when work was to cease permanently. The shaft in which this ore was cut is about 350 ft. deep, and in good condition to handle any fair tonnage that may be mined. The ore has been drifted upon for 75 ft., running quite uniformly 56 iron and .013 phosphorus, high in silica and low in moisture, making it the equal of any ore now mined in the region. Contracts have been made for sample cargoes and the Wisconsin & Michigan road is to build a short spur to the mine, which should be a considerable producer the coming year. There is nothing good enough for John T. Jones and his family, and the general hope is that the old Saginaw is to become a large and profitable mine under their control.

Another find that may lead to something at Norway is that of John Tregillis, who, while sinking a well, ran onto a formation of mixed ore and sandstone of which he got assays of about 48 to 50 percent and low in phosphorus. The find will be explored at once.

Absorbed By International Harvester Co.

The International Harvester Co. has purchased the plant and business of the Aultman & Miller Buckeye Co., Akron, O., and these works will hereafter be known as the Buckeye Works. The company has also secured an option on the wagon plant of the Bettendorf Axle Co., Davenport, Ia., for five years, following the contract it recently made with this company, under the terms of which it will market the entire output of the Bettendorf steel wagons.

About a year ago the International Harvester Co. of America, by a selling arrangement with the Weber Wagon Co., undertook to sell the manufactured product of that company. The Weber company was unable to supply the demands of the International Harvester Co., of America, and have decided to engage in the manufacture of wagons. With this object in view, the International company purchased the property of the Weber Wagon Co., and will hereafter operate that plant.

The International Harvester Co., however, has been enabled to secure options of purchase covering the property of two of these corporations, has determined to exercise these options at this time, and is now engaged in taking over the assets of the Aultman & Miller Buckeye Co.and the Keystone Co. The future of the Aultman & Miller Buckeye Co. plant is as yet undetermined. The Keystone plant will be used for the manufacture of machinery heretofore produced by the Keystone Company. The assets of the Minnie Harvester Co. are being taken over by the International Flax Twine Co., organized to manufacture and sell flax twine.

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NOVEMBER 9, 1905

PRINTED IN AN OPEN SHOP

SOUND IN LAW AND ETHICS.

In announcing editorially last week our determination not to submit to the demand for a closed shop on the part of printers of the Penton Publishing Co., we had entire confidence in the justice of our position, believing that it rests on a sound foundation of law and ethics. Some recent decisions are important as showing the latest expressions of courts of high standing concerning the rights of employer and employe. Especially pertinent is the decision rendered by Judge Holdom of the Superior Court of Cook County, Ill., in the case of the injunction granted the Chicago Typothetæ against Typographical Union No. 16. The purpose of the conspiracy alleged in that case was to force complainants (the employers) to surrender to the union demands for the closed shop and the eight-hour day, or to destroy their business as a penalty for their refusal. The court in making a temporary injunction permanent, held that both the closed shop and the eight-hour day are unlawful, when it is attempted to coerce the employer to make a contract against his will. The United States Supreme Court having held that the sovereign power of the State of New York could not force an eight-hour day upon the employer, the Superior Court of Cook County held that what the sovereign power of the state could not do could not be done by any other power, and that the union of labor, like all others, whether natural or artificial persons, must yield its principles whenever they conflict with the law of the land.

While in the case of the strike of printers employed on publications of the Penton Publishing Co., there has happily been no violence up to the present time, the attempt to coerce the employer is unmistakable. We believe, however, that even if the element of coercion did not exist, the strike would be unjust because it would be an attempt to induce the employer to discriminate unjustly in employing men. In the case of Mathews vs. the People, when considering the free employment act, the Superior Court of Cook County, Ill., declared that a law which provides for discrimination between different classes of citizens is founded on no justifiable ground, but is an attempt to exercise legislative power in behalf of certain classes against the other classes, whether laborers seeking work or employers, and falls under the condemnation of the constitution.

If such discrimination cannot be justified in law, and if a law providing for such discrimination is declared unconstitutional, we believe it is perfectly clear that no employer has a moral right to discriminate in the employing of labor, although the court did not feel called upon to go quite that far in its decision, the only question before it being the constitutionality of a certain clause of the free employment act.

The Court also said, "It is now well settled that the privilege of contracting is both a liberty and property right. Liberty includes the right to make and enforce contracts because the right to make and enforce contracts is included in the right to acquire property. Labor is property. To deprive the laborer and employer of this right to contract with one another is to violate section 2 of article 2 of the constitution of Illinois, which provides that no person shall be deprived of life, liberty or property without due process of law. It is equally a violation of the 5th and 14th amendments of the constitution of the United States, which provide that no person shall be deprived of life, liberty or property without due process of law, and that no state shall deprive any person

of life, liberty or property without due process of law, nor deny to any person within its jurisdiction the equal protection of the law." The present strike directly affects the property of this company, as it does the labor (which is property) of all men who seek employment.

This company has never discriminated against union labor; in fact, nearly all of the employes engaged upon its publications have been union men, but when the union attempted to force the making of a contract which would deprive non-union men of the privilege of employment, we believed that they were making a demand which could not be justified in law or by what is universally considered by fair minded men as giving one another a square deal. The spirit of all decisions of eminent jurists in recent years has been strongly in favor of the utmost liberty of employer and employe in making contracts, and it is in harmony with that spirit that we now are fighting for the open shop. To subscribers, advertisers and other friends who have heartily extended their congratulations upon the position we have taken, and have given promise of their sympathy and support, we extend our thanks. After a week's experience with the strikers, we are more confident than ever that although the contest may be a long one, we shall ultimately succeed, and that the moral effect of the victory will be far reaching.

No man in the iron business in the central west is more beloved than Joseph G. Butler Jr. The naming of a splendid new vessel for him is indeed appropriate in honoring one so worthy and in recognizing the close relation between the carriers and users of iron ore.

SURPLUS STEEL SUPPLY DIMINISHED.

The question has frequently been asked of late, "Where is the surplus steel going?" The term "surplus steel" used in this connection refers to semi products, billets, sheet bars, slabs, etc., which are not rolled into ultimate finished material at the seat of production, but are shipped elsewhere. Thus the Carnegie Steel Company produces at certain plants large tonnages of billets which are shipped to certain plants of the American Steel & Wire Company, and to various outside customers, and large tonnages of sheet bars which are shipped both to the allied sheet and tin plate mills and to outside sheet and tin plate mills. Nearly all of the various outside steel producers also have surplus steel which goes to finishing mills not possessed of steel producing capacity of their own.

The fact that the tonnage requirements of the sheet and tin plate mills, however owned, have been much less since the middle of the year than they were during the first half, while in wire products and pipe the same conditions have existed, though to a less extent, has given rise to the query mentioned. The finishing mills directly attached to steel works were, to all appearances, operated at full capacity during the first half of the year, yet there was surplus steel to keep the detached finishing mills in operation. In the past few months these detached finishing mills have been using much less steel, yet there is an absolute scarcity, and it has been nothing but the actual inability of consumers to pay more money which has restrained prices of crude steel from advancing even more than they have, although the advance actually made has been a fairly large one.

The inference that there is an anomaly in the present condition is based upon the assumption that there is as much surplus steel as there was, and this in turn on the assumption that if attached finishing mills were running to full capacity in the first half of the year they can do no more now. This is not true. A large proportion of the surplus billet tonnage is produced on interchangeable mills, which roll rails for a portion of the time. Some of these mills also roll sheet bars at times. Since the middle of the year all the available capacity has been kept on rails, and will be kept on rails well into next year, and probably clear through the summer. The Ohio mill at Youngstown, for instance, did not roll a rail for more than a year up to last July, since when it has been exclusively on rails, and will be into next year. Its entire steel tonnage in the first half of this year contributed to the surplus billet and sheet bar supply. Other mills, now wholly on rails, contributed lesser tonnages to the surplus steel supply.

It is furthermore the fact that the production of attached finishing mills has increased. They are striving each month to break all their previous records, and are very often successful. In all large plants containing a number of finishing mills the breaking of records in one mill or another is so common as to attract but passing notice.

The surplus steel supply of the country, therefore, is really much smaller than it was before midsummer, and it is by no means surprising that it is inadequate. It is obvious that there is room for more steel plants. The general alignment of the iron industry has always been that there should be some surplus of finishing capacity over steel making capacity, because it cannot be expected that all finished lines can find business for their entire capacity at one and the same time. The disproportion has of late become too great. There is a promise of demand to keep the present capacity in rails, plates, shapes and merchant bars in operation through next summer. Should the demand for merchant and line pipe, wire products, sheets and tin plates be up to expectations for these lines, it will be absolutely impossible to produce the steel required.

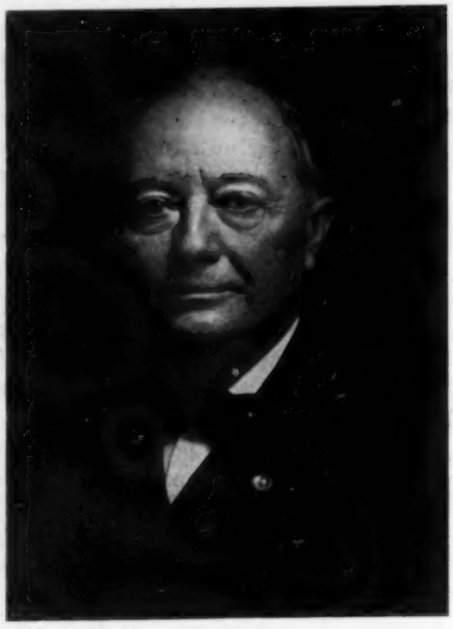
NESTOR OF THE IRON TRADE HONORED.

THE JOSEPH G. BUTLER JR. LAUNCHED AT LORAIN, SATURDAY.

New Record Made For the Building of Ships on the Lakes—All Conditions Auspicious.

JOS. G. BUTLER 3D.

The weather was most auspicious and all other conditions as favorable as the most fastidious could desire, when the steel freight carrier Joseph G. Butler Jr., was launched last Saturday afternoon at the Lorain plant of the American Shipbuilding Co. The launch of this steamer was but a duplication of the score or more of large lake freighters which have been dropped into the water by the shipbuilding company with the past year, but there was a particular significance pointing as it did to the closer relations in a business way between the consumers and carriers of iron ore, the leading commodity carried on the great lakes. Generation after generation since the time of the Revolutionary war the ancestors of Joseph G. Butler



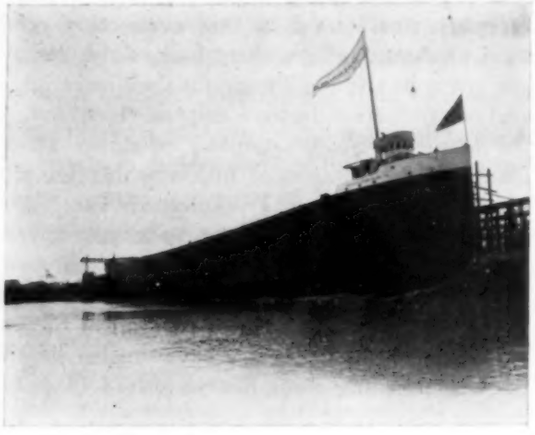
JOSEPH G. BUTLER JR.

Jr., for whom the boat launched Saturday was named have been in the iron business. When the big 10,000 ton ship glided gracefully into the waters of the slip at Lorain Mr. Butler witnessed not only one of the final steps in the completion of one of the most modern carriers on fresh water, but also one step of a record breaking feat in ship construction. This ship was ordered for delivery at the opening of navigation 1906. The keel was laid Sept. 6, last, 55 working days before the boat was launched. The builders have promised to deliver the Butler complete and ready to go into commission Nov. 25, eleven weeks from the time the first work was started, and in time to make one trip before the close of the season this year. This record is even more remarkable than that made on the steamer John Stanton, which went into commission Oct. 10, although the contract did not call for delivery until next spring.

The Joseph G. Butler Jr., measures 545 ft. over all, 525 ft. keel, 55 ft. beam and 31 ft. deep. She will have 32

MRS. E. L. FORD, J. G. BUTLER JR., MISS JOSEPHINE BUTLER FORD.

hatches, spaced 12 foot centers, the cargo hold is constructed on what is known as the girder system being continuous and without obstructions with the exception of the two steel bulkheads which divide the hold into three compartments. The vertical tank sides of the Butler are similar to those installed in the boats recently constructed, sister ships to the Butler being, the W. A. Rogers, built at Lorain and the Amasa Stone, and L. C.



BUTLER JUST BEFORE LAUNCHING.

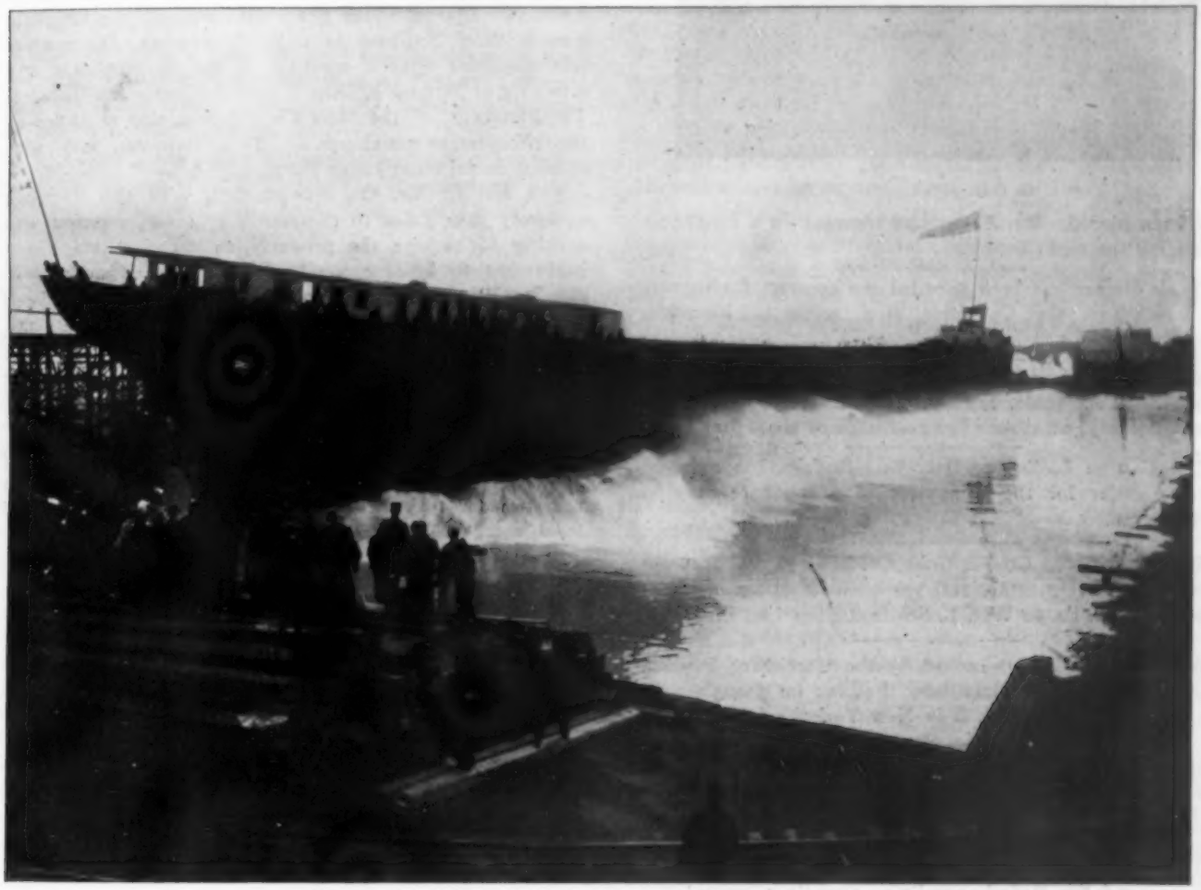
Hanna, built at Wyandotte, Mich. The triple expansion engine has cylinder dimensions 23 1-2, 38, and 63 by 42 in. stroke. Two Scotch boilers 14 ft. 6 in. in diameter by 11 ft.

6 in. long with a working pressure of 180 lb. and fitted with Ellis & Eaves draft will furnish the steam.

The ship was christened by Miss Josephine Butler Ford, of Youngstown, granddaughter of Joseph G. Butler, Jr., and daughter of E. L. Ford, of the Youngstown Steel Co. On the launching stand were the guests of Mr. Butler, Capt. Chas. L. Hutchinson, who will manage the new boat, and Mr. J. C. Wallace, of the Shipbuilding Co. A special car conveyed the guests from Cleveland to Lorain and return. Upon the return to Cleveland an informal dinner was given at the Union Club, the following being present: Mr. and Mrs. Joseph G. Butler Jr., Youngstown; Col. J. M. Schoonnaker, B. C. Vaughn, C. F. Perkins and Robert A. Walker, Pittsburg; Mr. and Mrs. Henry A. Butler, John Stambaugh, R. C. Steese, Mr. and Mrs. C. S. Crook, Mrs. E. L. Ford, John W. Ford, Josephine Butler Ford, Paul Jones, and brought out the steamer Martin Mullen in 1904, and this season sailed the Wm. A. Paine

Mr. Butler's Career.

J. G. Butler Jr. has been connected with iron interests since he was 13 years of age, and in going into the business he followed the examples of his father, grandfather and great grandfather. Mr. Butler's great grandfather was in the charcoal iron business at the time of the opening of the Revolutionary War, and he and seven brothers were soldiers in the army of George Washington. Mr. Butler's father was a pioneer in the Lake Superior iron region, being associated with Peter White as far back as 1854. At thirteen, young Butler began working in the store of James Ward & Co., at Niles, which sold goods to the employees of the rolling mill. He served in this store in different capacities for several years, and then went to Youngstown, where he entered the employ of



LAUNCH OF STEAMER JOSEPH G. BUTLER JR.

Joseph Butler 3d, of Youngstown; Chris. Grover, Capt. and Mrs. Chas. L. Hutchinson, Mr. and Mrs. James C. Wallace, Robert Logan, Robert Wallace, Mrs. W. H. Becker, W. H. McGean, Mrs. John Donaldson, John Mulrooney, John Manuel, Edward Wiliams, Henry, Steinbrenner, Mrs. C. H. Myers, J. B. Guthrie, Frank Billings, Mr. and Mrs. Thos. Young, Prof. Jones, Capt. F. D. Harriman and Capt. E. K. Hutchinson.

There were no formal speeches, but in a few remarks Mr. Butler and Capt. Charles L. Hutchinson complimented the American Shipbuilding Co., and all connected with the construction of the steamer Joseph G. Butler, Jr., on the excellent showing made. The new boat will run to the head of the lakes light on her first trip and bring down a cargo of grain. She will be in command of Capt. W. P. Benham, who

Hale & Ayer, jobbers and part owners of the Brown-Bonnell plant, which is now one of the interests of the Republic Iron & Steel Co. In 1866 Mr. Butler went to Girard, Pa., and became one of the original partners in the Girard Iron Co. In 1878 he left Girard, going to Brier Hill and becoming associated with Governor Tod's sons in the Brier Hill Iron & Coal Co., of which he became general manager, and has continued in that position up to the present time. He is also interested in several iron ore mines on Lake Superior ranges. During the past 10 years, Mr. Butler has been very active as a representative of Bessemer pig iron interests in negotiating large sales and has rendered service of the highest value. He is regarded as one of the best informed and ablest pig iron salesmen in the country. His friends tell many stories illustrating his shrewdness and hustling quali-

ties. For example, a few years ago a large purchase of pig iron was to be made at Wheeling. A number of salesmen started for Wheeling via Pittsburg. Mr. Butler was with the other salesmen at Pittsburg, but mysteriously disappeared before evening. His companions enjoyed a comfortable night's rest at Pittsburg, and when they arrived in Wheeling the next day, found that the order

IN THE SLIP AFTER LAUNCHING.

had been placed. Mr. Butler had traveled on a freight to Wheeling the night before.

D. H. Hunter has been awarded the contract for the office building of the Carpenter steel works at Riverside, near Reading, Pa.

Westinghouse interests within the past few weeks through Takata & Co., Tokio, have placed contracts for electrical machinery in Japan of an aggregate value of about $100,000.

The George L. Squier Mfg. Co., Buffalo, has received a large order for the equipment of a sugar refinery in Kobe, Japan.

The Washington Coal & Coke Co. has awarded the contract for the structural steel work on its power plant at Star Junction, Pa. to Wm. B. Scaife & Sons Co., Pittsburg.

Among recent orders booked by the Harrisburg Foundry & Machine Works at Harrisburg, Pa., are for 3 engines for the new day and night bank in New York; 4 for the Santa Fe railroad for an electric plant; a 350-horse power machine for the Clarksdale, Miss., municipal light plant; a 150 horse power engine for the Reading Iron Company's works at Reading.

The Bethlehem Steel Co., the Crucible Steel Co. of America and the Midvale Steel Co., recently submitted bids of 40 cents per pound each for a set of nickel-steel forgings for the 3-inch field rifle, model of 1902. The Crucible Company offered delivery in fifty days, the other companies in seventy. In navy yard supplies for 108,750 pounds of steel rods the Crucible Company bid $4,615.02 and J. B. Kendall, Washington, D. C., bid $3,255.50.

Lead.—Consumers bought heavily of all grades of pig lead and prices have been well maintained. Today's closings; 5.20c to 5.30c; St. Louis, 5.15c; London £15.

Spelter.—The demand is only moderate and the market has been quiet and easy. Today's closings follow: Spot, 6.10c to 6.20c; St. Louis, 6c; London, £28 5s.

Antimony.—The market has been quiet, the demand being fairly moderate. Today's quotations follow: Cookson's 12½c to 13c; Hallett's, 12c to 12½c; other grades, 11½c to 12¼c.

VARIOUS RUMORS.

Concerning Future of LaBelle Iron Works—Options are Being Secured.

Options are being secured on the stock of the La Belle Iron Works at $200 per share of $100 par value, but the identity of the interests seeking control of the big plants at Wheeling and Steubenville is shrouded in considerable mystery. The deal is being engineered by Edwin S. Ohl, a former director of the Republic Iron & Steel Co., and a prominent figure in Valley pig iron affairs. The options are to run until March 1, and are to pay one percent monthly. Dividends during that period go to present holders unless the options are taken up before the regular dividend time.

Three parties are connected by rumor with the negotiations, the United States Steel Corporation, the Republic Iron & Steel Co., and Alex. W. Thompson. The project was disclosed after a meeting of the stockholders and directors at Pittsburg, Nov. 1, and the American Sheet & Tin Plate Co., of the Steel Corporation, was reported as the prospective purchaser. This, however, met with prompt denial from Judge Gary.

The fact of Mr. Ohl's connection with the Republic company gave color to the rumor that this concern was seeking to acquire the property as the first step in a movement to become a more formidable competitor of the Steel Corporation. So far this report has not been given a denial. The belief was also expressed that Mr. Thompson, former president of the Republic company, was promoting the combination of independent sheet and steel manufacturers with a capitalization of $100,000,000, and sought the La Belle company as the central interest. Official denial of this, however, has been made along with the statement that Mr. Thompson is to take up an enterprise not connected in any way with an iron and steel merger.

The La Belle company is capitalized at $7,000,000, which would make the purchase price $14,000,000; it has a bond issue of $2,500,000. At Steubenville it owns two blast furnaces with a daily capacity of 800 tons of pig iron, 11 open-hearth furnaces that produce 1,200 tons a day, skelp mills and a pipe plant. At Wheeling there is a cut nail factory with 173 machines and a capacity of 300,000 kegs of nails a year, and a light nail plate mill. The Pitt Iron Co., with large ore mines in Minnesota, is also owned by the La Belle company, which has besides 2,500 acres of coal land in West Virginia and Ohio, and 200 coke ovens in the Connellsville region.

Will Sell Products Direct.

The Tennessee Coal, Iron & Railroad Co., announces a radical departure from its established policy for Jan. 1, 1906, when it will discontinue selling its products through agents and will open sales offices in a number of the leading markets, including New York, Chicago, St. Louis,, Cincinnati, and possibly other cities. Frank A. Burr, general sales agent, announces that after that date all sales will be made direct to customers. The Tennessee Co. has furnished a considerable part of the business of Matthew Addy & Co., for some years.

The Coles Tool & Machine Co., Oneida, N. Y., has been incorporated with a capital stock of $10,000 to manufacture machinery and tools. The incorporators are Theodore and Frances N. Coles, James B. Backer, William H. Merrill and Willard E. Stone, all of Oneida, N. Y.

PERSONAL.

Andrew Carnegie has returned from abroad.

S. A. Watson, formerly sales agent in the New York office of the American Steel Foundries, has been appointed manager of the Thurlow plant of the corporation.

F. A. Austin has accepted a position with the Erie Foundry Co., as manager of its machinery sales department. Mr. Austin was superintendent of the Erie Traction Co., Erie, Pa.

John H. Neary has accepted the position of superintendent of construction of the Crane Co., Chicago. Mr. Neary was formerly chief engineer of the Federal Building at Milwaukee, Wis.

The Colorado Fuel & Iron Co. has chosen Willard P. Ward, vice president of the Distillers' Securities Corporation, to succeed James H. Hyde who recently resigned from the directorate.

Myron Phillips has been appointed superintendent of the lower mills of the Carnegie Iron & Steel Co., at Youngstown, succeeding Perry Edwards, who remains with the company in another capacity.

S. S. Knight has resigned his position as general manager of the Birmingham Pipe & Casting Co., Birmingham, Ala., to connect himself with Abendroth Bros., Port Chester, N. Y. The change was effective Nov. 1.

Tracey B. Guthrie, of Columbus, O., has been placed in charge of the coal and coke properties of the Republic Iron & Steel Co. For the present he will be located in Pittsburg, later establishing his headquarters in New York.

W. Manton Dailey, who recently resigned as general manager of the American Seamless Wire Co., is to become the manager of the American Wire & Supply Co., a new $250,000 concern located at Attleboro Mass.

Mr. G. H. Armstrong, formerly assistant secretary, at Uniontown, of the Pickands-Magee Coke Company, has been attached to the Pittsburg office of Matthew Addy & Company, Farmers Bank Building, in charge of Mr. Eliot A. Kebler.

David Tod, on the occasion of his leaving the Struthers Furnace Co., where he was manager of the cement department, was presented by the employes with a handsome pair of field glasses. He retires to devote his entire attention to the estate of his father.

E. S. Mills, of Cleveland, is at Lakeside hospital in that city, recovering from a dangerous operation. Since resigning as assistant to Vice President Gayley of the United States Steel Corporation about two years ago, Mr. Mills has traveled extensively in Europe in search of health.

W. W. Butler, second vice president of the Simplex Railway Appliance Co., has been elected to the same office in the American Steel Foundries to fill the vacancy caused by the resignation of W. D. Sargent. The latter continues as a director, having served in that capacity since the organization of the company.

W. O. Washburn, formerly Chicago sales manager of the Reeves Pulley Co., has been made manager of sales of the American Hoist & Derrick Co., St. Paul, with headquarters in that city. C. E. Potter, formerly assistant to Mr. Washburn in Chicago, has succeeded him in his former connection.

C. W. A. Koelkebeck, mechanical engineer, for the past four years with the Garrett-Cromwell Engineering Co., and for ten years previous with Julian Kennedy, has joined the engineering staff of the Wellmen-Seaver-Morgan Co., Cleveland, where his attention will be given to blast furnace, steel plant and rolling mill construction, etc.

OBITUARY.

Arthur Byron Capen, sales agent for the Babcock & Wilcox Co., died Oct. 27, at the Hotel Manhattan, New York. He was 44 years old.

Henry William Steele, 73 years old, head of the Scovill Manufacturing Co., of Waterbury, Conn., died Friday, Nov. 3, at his residence, at Montclair, N. J.

John Rice, head of the John Rice Foundry & Machine Works, Stephens Point, Wis., died Oct. 27, after suffering several years from a paralytic stroke. He was 68 years old.

Major John Byrne, president of the Pittsburg, Shawmut & Northern railroad and of the Shawmut Mining Co., and interested in other mining concerns, died Oct 31, at Mamaroneck, N. Y.

David H. James, a director of the Central Stamping Co., No. 24 Cliff street, New York, died at Northport, N. Y., Nov. 5, aged 71 years. He was at one time president of the James Aikman Tin Manufacturing Co.

Charles J. Devlin, widely known as a coal operator, died at Chicago, Oct. 31, as the result of a stroke of paralysis. He was at one time at the head of twenty-six different concerns.

Cyrus I. Bewley, president and general manager of the Oregon Foundry & Machine Company, Oregon, Ill., died Friday, November 3. Prior to his establishing this company, Mr. Bewley was with the McCormick Harvesting Machine Co., having been employed there for twenty-five years.

Sereno T. Merrill, president of the Fairbanks-Morse Mfg. Co., died at Beloit, Wis., Oct. 22, aged 89 years. In 1846 he located at Beloit and in 1872 purchased an interest in the Beloit Iron Works, afterwards becoming the president and treasurer of the company. He leaves a widow and five children.

Gilbrath S. McFadden, prominent as a contractor of Moundsville, W. Va., died Nov. 5 at the home of his niece, Mrs. Alice Frezzell at Salem, Ore. He was the father of W. H. McFadden, vice president and general manager of Mackintosh, Hemphill & Co., Pittsburg. He was eighty years of age.

Edwin A. Wood, founder and president of the Utica Steam Gauge Co., Utica, N. Y., died Oct. 27 at Evanston, Ill., after a long illness resulting from a stroke of paralysis. He came of an engineering family, his father being a machinery manufacturer and a brother at the head of the Wood & Mann Steam Engine Co., Utica.

John Loughrey Awl, aged 75, died Oct. 26 at the home of his daughter in Pittsburg. He was prominent in the iron and steel business in Pittsburg for many years, being for a time connected with the Sligo Iron & Steel Co., but retired about 10 years ago. One of his sons is connected with the Crucible Steel Co. and another with the Carnegie Co.

Carl Spaeter, one of the pioneers of the German iron trade, died recently at Coblenz. He became a partner of Ludwig Wirth in 1860, acquiring the entire control some time later .He was instrumental in the promotion of the great iron and steel plants in the Minette district of Lorraine and was heavily interested in magnesite deposits at Veitsch, Styria.

George C. Bailey, general western manager and secretary and treasurer of the John A. Roebling Son's Company, Trenton, New Jersey, died at his home in Chicago Friday, October 27th. Mr. Bailey was born in 1843 in Lambertville, N. J., and has been connected with the Roebling Company twenty-four years, nineteen of which were spent as Chicago manager.

WINTER ORE ACTIVITIES.

Important Operations Planned On Upper Ranges—The Season's Business.

(Special Correspondence.)

DULUTH, MINN., Nov 4.—Current reports as to the immediate electrification of the "hill line" of the Duluth, Missabe & Northern road, from its docks to the terminal village of Proctor, about 6 miles, are without the slightest foundation. It is true that some time this scheme may work out, and the railroad company has permitted the leading electric companies in connection with the Great Northern Power Co., of Duluth, to look over their lines and make estimates of cost, but it has not taken the matter up in any form at all, it has never been brought to the attention of its directors, and may not be for some time to come. It is only if the scheme shall show considerable of a saving that it will be presented to the company, and it is not yet determined by the power company what saving can be effected.

The Duluth & Iron Range will raise its main line about 6 feet this winter, at miles 69, 70 and 71, where there is a bad sag. The road has now completed its double trackage to its mines from the ore docks at Two Harbors, and will have large crews of men on the line all winter repairing, in anticipation of the great business expected next year. It will build a large coal-receiving dock at Two Harbors, which will differ from any such dock now in use, in that it will have an elevated pocket of about 5,000 tons capacity, into which coal will be unloaded by the whirlies, and from which cars will be loaded by gravity, for delivery at points along the main line and to mines. This road has been equipping some of its docks with main lines for steam, for steaming frozen ore in cars, the lines to be supplied by locomotives and the steam distributed where needed by the permanent piping. Ore in steel cars freezes quickly, and at slight degrees of frost, and in this particular, steel cars are less desirable than wood.

The eastern portion of the Commodore mine, at Virginia, is to be stripped, and work has commenced in a preliminary way. This end of the mine is next to the Republic Iron & Steel Co.'s Union, and the stripping of the first will make it easier to carry out the same work on the second. It is under consideration now for the Union, and may be undertaken in a short time. About 200,000 yards will be taken off the Commodore.

At the Caspian mine, in Iron county, the Cleveland firm of Pickands, Mather & Co. have proven up a very large and excellent ore body. Every drill hole for a stretch of 1,200 feet has cut ore.

The Clevleand Cliffs Iron Co. has bought several more claims near the Iron Belt region of the Gogebic range, and is to spend about $150,000 in improvements and explorations the coming winter.

The Malta and Sparta mines of Pickands, Mather & Co., on the Mesabi range, have closed down for the year.

The Standish ore body, in lots 2 and 3, section 5, T 57-20, has been sold to eastern furnace interests. It contains about 7,500,000 of low grade ore, and the price of the lease was about $350,000. The land belongs to the Vermillion Range Land Co., and was under lease to Messrs O. D. Kinney and E. B. Hawkins, of Duluth. The mine will be stripped when opened for operation, which may be in a year or two.

Stripping has begun on the Mayas land east of Mesaba station, and it is such light work that wheel scrapers will do it all. There are about 25,000 yards to take off and it will be pretty well over this fall.

The Chicago, Milwaukee & St. Paul road is building for its ore-traffic between points on the Menominee range and its docks at Esacnaba locomotives that weigh 250,000 pounds on drivers, and about 350,000 pounds in working order. These are particularly for the hill between the mines at Iron Mountain and Channing. They will be built at the road shops at Milwaukee, where several hundred 50-ton ore cars will also be put up this winter.

Mr. Walter Fitch, for a great many years chief mogul of the village of Champion, where he was superintendent of the Champion Iron Co., then manager at Duluth for the W. P. Snyder interests in mines along the lake, and a year ago made general manager of the U. S. Mining Co., at Salt Lake, has resigned that place, to take up work for himself, in properties he has acquired in the west.

The Northern Ore Co., has let a contract to Longyear & Hodge, drillmen, to explore the old Appleton mine, at Loretto, and they will do extensive drilling there. Mr. Hodge was on the ground recently.

At the Breen mine, which is managd by Supt. Brown, of the Pewabic mine, they have shipped 25,000 tons this year. They have finished work, and have begun unwatering No. 2 shaft which is 250 ft. deep, and has little in the way of developments underground. No. 1 shaft is to be deepened to 200 ft. It is expected that next year's shipments will be much greater than those of 1905.

Shovels are now working rapidly in the Chapin stockpiles, which are still rather large. The intention is to clean up the ore on surface before the close of navigation, and to work heavily all winter.

More Supplies for Panama.

WASHINGTON, Nov. 8.—The Panama Canal Commission is planning to make further extensive purchases of equipment for its machine shops on the Isthmus and proposals will, in the near future, be invited for items that will include the following: two band saws, 38-inch wheel and resawing attachment, two automatic saw-setting machines and frames, one iron frame ripping saw table for saws 24 inches in diameter, one 20-in. sawing wood turners, and pattern makers' lathe with iron bed, one car sill and timber dressing machine, extra heavy pattern, to surface two sides at once up to 24 in. wide or to surface four sides at once up to 12 in. wide, one 10-in. swing lathe, 4-ft. bed, one 18-in. swing, 8-ft. bed engine lathe, one 36-in. swing 24- ft. bed engine lathe, one 30-in. upright drill, two sets of power plate bending rolls, two power double punch and shears, four Wells lights, 800 candle power complete, one 24-in. lathe with taper attachment, one 24-in. chuck; one 12-in. lathe with taper attachment; one 12-in. chuck; one drill one 24-in. planer, one planer chuck, round base, 15-in. jaw chuck 1-2 by 3-4 inch, one 28 in. upright drill with 3 chucks, one 20-in. drill, and one No. 2 chuck.

Buffalo Foundrymen's Association.

The regular monthly meeting of the Buffalo Foundrymen's Association was held at its headquarters No. 685-687 Ellicott square, on Tuesday, Oct. 17th, at 8 o'clock, p. m.

President Hubbell occupied the chair, with 27 members and visitors present.

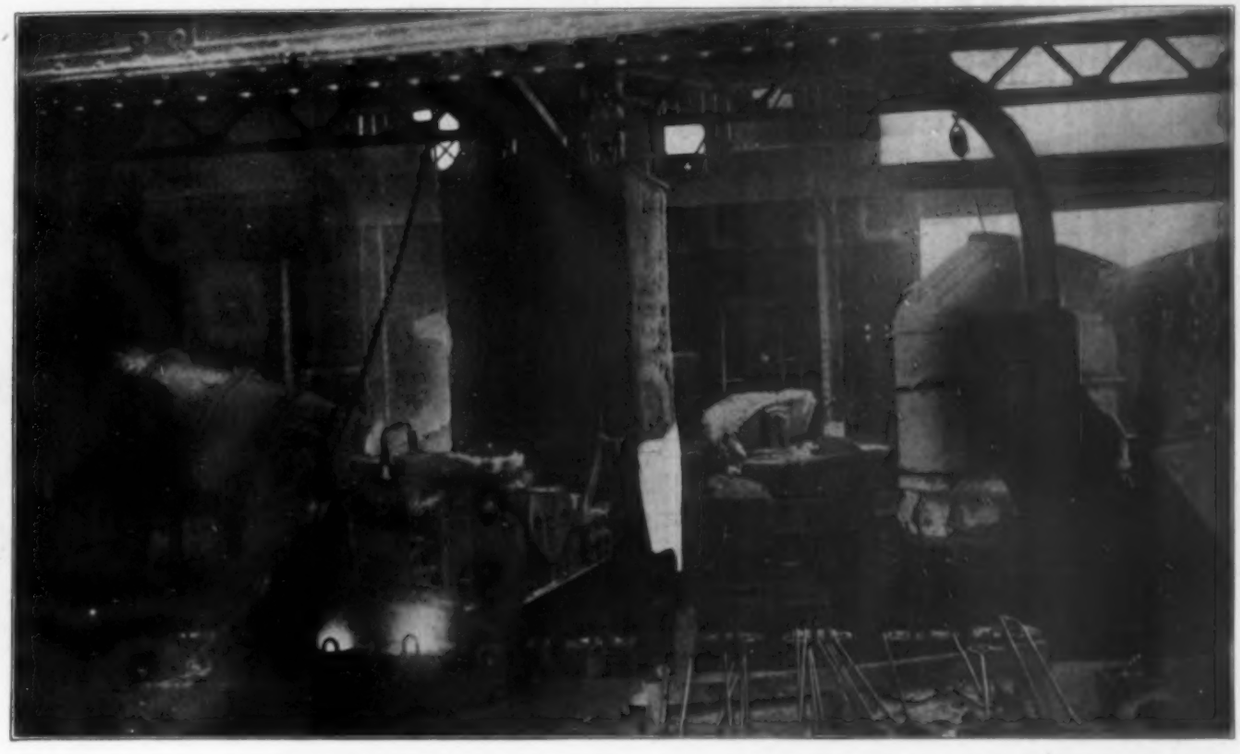
Mr. W. J. Patchell, president of the Union Iron and Foundry Co., of St. Louis, Mo., happened to be in the city on business. He was invited to attend the meeting and after the regular order of business was disposed of, he gave a very interesting talk on a molding machine he had invented, and which is being very successfully operated in his plant, for which a vote of thanks was tendered him before adjournment.

The chair introduced Mr. L. C. Dodd, consulting metallurgist, associated with the Snow Steam Pump Works, who read a paper on the "Metalloids of Pig Iron." After a general discussion of same, during which many questions were asked and answered by Mr. Dodd, the meeting adjourned.

The Rail Mill of the Republic Iron & Steel Co. at Youngstown, O.

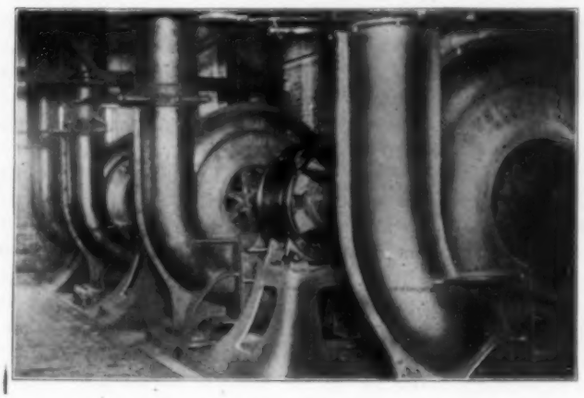
BY AN EDITORIAL REPRESENTATIVE OF THE IRON TRADE REVIEW.

The Republic Iron & Steel Co. has recently erected at its Youngstown plant a new rail and bar mill. In the process of the manufacture of Bessemer rails at this plant, pig iron is supplied to the cupolas from the company's blast furnaces, there being two located at Youngstown, O., one at Sharon, Pa., and one at New Castle, Pa. It is the intention of the company, however, to eventually use hot metal from the blast furnaces, and plans are now under way with this idea in view.



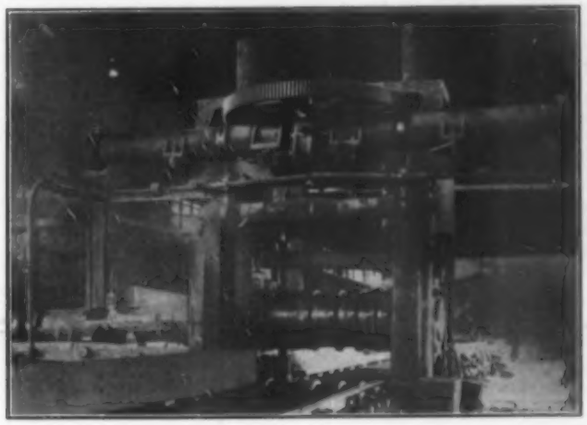
BESSEMER CONVERTERS OF THE REPUBLIC IRON & STEEL CO., YOUNGSTOWN, OHIO.

The pig iron is remelted in cupolas, there being six, each with a capacity of 15 tons per hour. Blast is supplied by a battery of four fans located in a house adjacent to the cupolas. These fans are installed in a distinctly novel fashion, being directly connected to Westinghouse 55 horsepower motors. This method of driving has proved to be more efficient than the old method of driving by belts. In addition the space required for the fans and motors is greatly reduced.



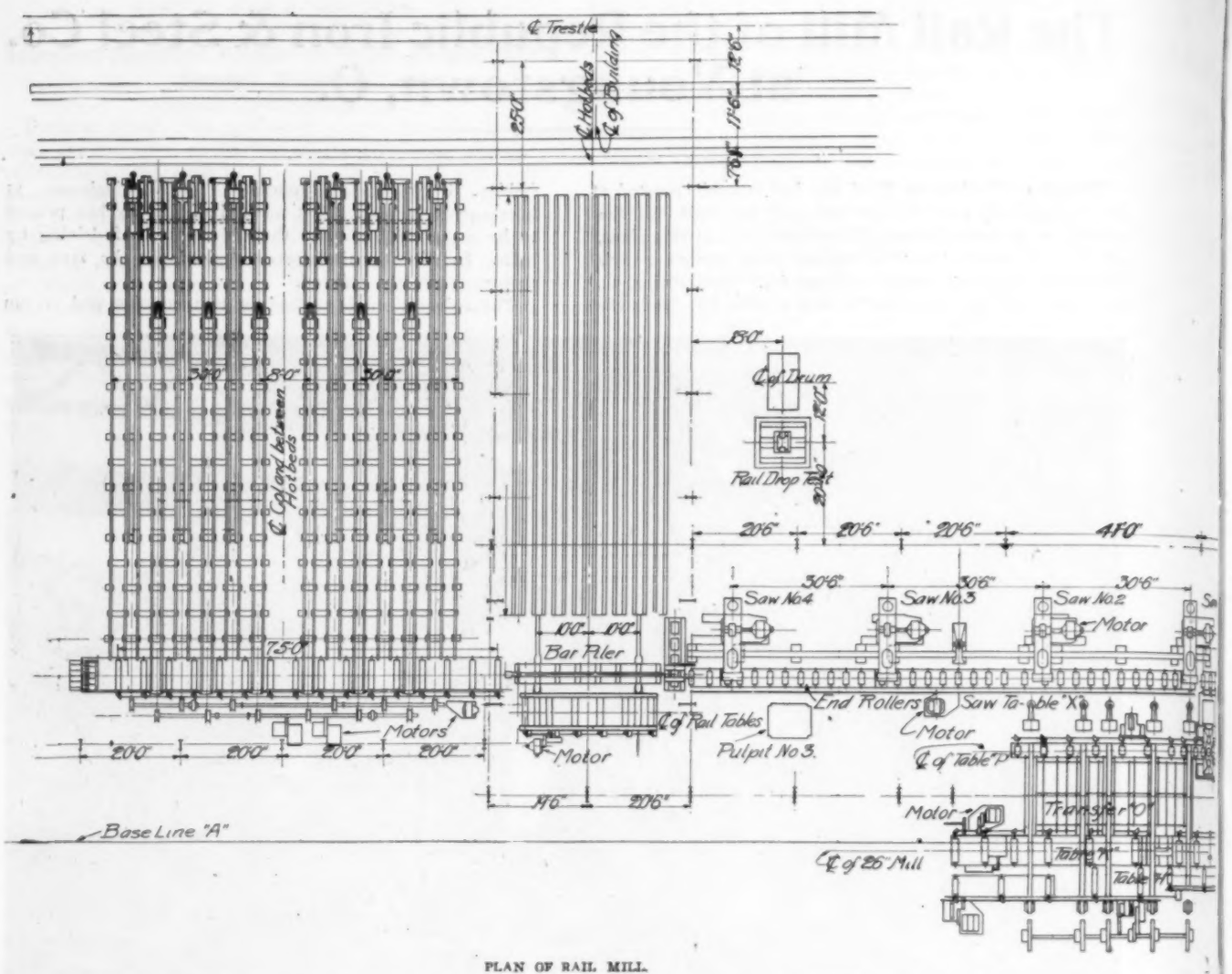
CUPOLA FANS, REPUBLIC IRON & STEEL CO., YOUNGSTOWN, OHIO.

The spiegeleisen is melted in two cupolas and is run from the cupolas through troughs to a ladle which is suspended from an electrically driven trolley, which trolley is controlled by an operator on the pouring floor of the converter mill.



BLOOMING MILL, REPUBLIC IRON & STEEL CO., YOUNGSTOWN, O.

The converters are two in number and are each of 10 tons capacity. They are tipped by means of vertical



PLAN OF RAIL MILL.

hydraulic cylinders which operate two vertical racks. The racks move in opposite directions and mesh with the pinion on the converter trunnion. This construction was installed on account of the lack of room for a horizontal cylinder and also to dispense with lost motion due to wear. The converters have been in service over three years and no adjustment has been required on the tipping mechanism.

Iron is brought from the cupolas in 10-ton ladles and is poured into the converters by means of a trough mounted on trunnions and swiveled so that it may be introduced into the mouth of the converter. This trough is swung out of the way when not in use. The converters are served by a ladle crane hydraulically operated which pours the steel into ingot molds mounted on railroad trucks. The ingots, after solidification, are taken to the stripper and the molds removed. The stripper is located in a house directly adjoining the Bessemer converters.

The blast for the converters is furnished by an Allis-Chalmers steeple type, cross-compound, condensing blowing engine located in a house immediately adjoining the converter building. The steam cylinders of this engine are 46 and 88 inches in diameter by 60 inches stroke. The air cylinders are 76 x 60 inches. This engine furnishes air at a pressure of about 25 pounds.

After being stripped the ingots are placed in soaking pits in order to bring them up to the proper temperature for rolling. There are four four-hole soaking pits to and from which the ingots are handled by two electrically operated cranes. These cranes are novel in that the operator rides on the crane carriage instead of being at one end. Producer gas is used for heating the pits, being furnished by six Laughlin gas producers.

Blooming Mill.

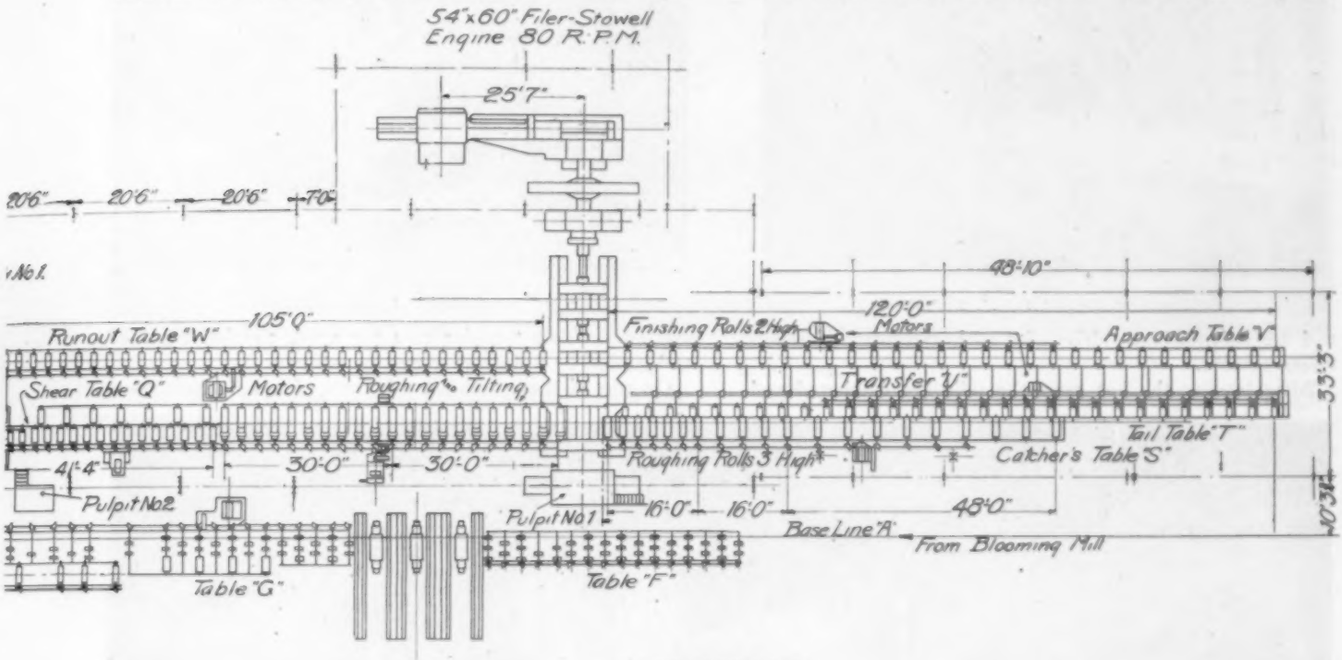
The ingots after being removed from the soaking pits are carried to the blooming mill which is located directly adjoining one end of the soaking pits. They are carried from the pits to the blooming train on a car fitted with a tipping carriage which tips the ingots on to the table of the blooming mill. The ingots are reduced to 8 x 8 inch blooms in a 40 inch two-high mill, which is driven by a 54 x 66 inch twin reversing engine. This engine was built by the William Tod Co., of Youngstown, O., and is fitted with a steam reversing gear. The blooms are cut at the hydraulic bloom shear to the proper length for making three 33 foot rails. This shear has its knife located at the bottom and is raised by hydraulic power in order to cut the bloom.

From this shear the steel is conveyed on the tables to the first roughing train designed for use in making rails. It may be cut, however, into short billets in which case they are delivered on to the transfer tables and moved off to one side of the mill and delivered into a train of cars running round a circular track. These cars pass underneath sprays of water which cool the billets, and at

the opposite side of the track from the mill a locomotive crane picks the billets off the small cars and loads them on to a railroad car.

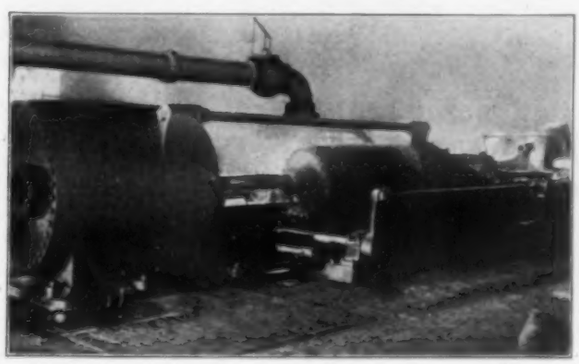
First Roughing Train.

This is a semi-continuous mill, composed of three sets of 26 inch two-high stands placed tandem, and is driven by a tandem, compound, condensing 44 inch and 80 x 60 inch engine, built by the William Tod Co. The piece receives four passes in this mill and is then conveyed on tables to the transfer which carries it to the tables entering the second roughing train or rail mill proper. In the first roughing train, the pieces are rolled both ways; viz., bloom receives its first pass in the first set of rolls, passes through a large space in the rolls of the middle set and receives its second pass in third set. It is moved over



PLAN OF RAIL MILL.

on the table and goes back towards the bloom mill through a space in the third set of rolls and receives the third pass in the middle set and passes through a space in rolls of the first set. The piece is next moved over on the table



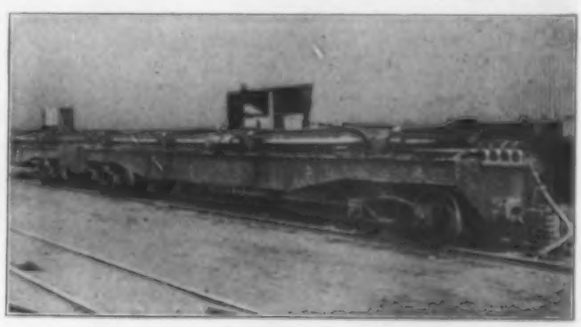
ENGINE OF FIRST ROUGHING TRAIN IN RAIL MILL.

and starts in the opposite direction, receiving the fourth pass in the first set of rolls and passing through spaces in the rolls of the second and third sets, continuing down the table to the transfer, which moves it to the finishing mill.

These movement are obtained by driving the mills with a train of gears in tandem and meshing with each other, the middle gear being connected to the engine shaft. Thus the pieces travel in one direction, while receiving passes in No. 1 and No. 3 stands and in the opposite direction to get a pass in the middle stand of rolls. Each alternate set of rollers on the tables is driven in opposite directions; the left hand roller on one shaft and the right hand roller on the next are idlers, thus allowing pieces to be moved back and forth in opposite directions at the same time.

Rail Mill Proper.

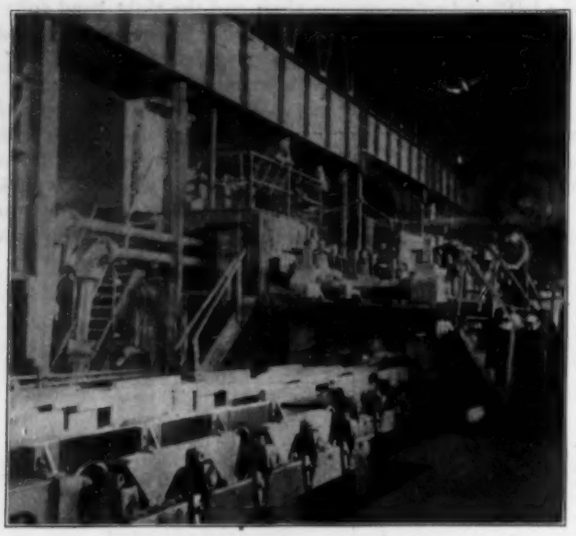
The rail mill proper consists of two mills. The second roughing train consists of one 28 inch three-high mill and the finishing mill of one 28 inch two-high mill. These two mills are coupled together and are driven by a 54 x 60 inch single cylinder non-condensing engine, built by the Filer-Stowell Co., of Milwaukee. On the entering side of the rail mill is a tilting table, driven by a railway type Westinghouse motor. The movements of the table are controlled by hydraulic power and the manipulation of the piece is all done automatically on this table. Five passes are given the piece in the three-high mill. It is



TRANSFER CARS.

then transferred from the receiving table to the delivery table of the two-high mill. The last pass in the three-high mill is at a higher elevation than the two-high mill. The two tables are joined by means of slide bars. A series of arms mounted on a shaft project underneath the delivery table of the three-high mill. When the piece is run on this table, these arms are elevated, lifting the piece

from the rolls and allowing it to slide down the bars connecting with the two-high mill. The pieces receive the finishing pass in the two-high mill. They are then stamped and conveyed to the hot saws, which cut them into rails of proper length. The saws are four in number

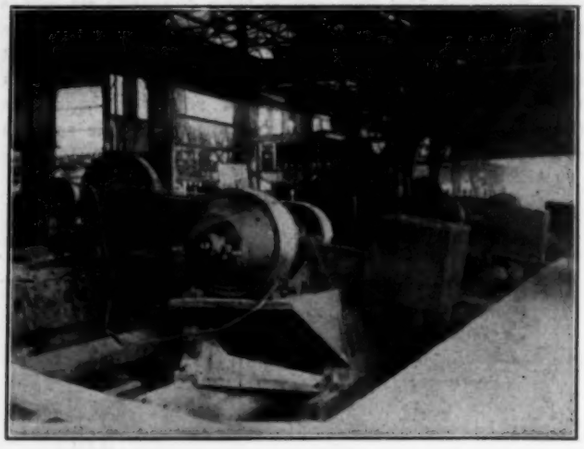


FIRST ROUGHING TRAIN, RAIL MILL.

and are independently driven by 40 horsepower Westinghouse motors.

After leaving the hot saws the rails are cambered and delivered onto hot beds which are beside the hot bed used for rails. When this is to be done, a section of the rail mill table is moved to one side and a bar piler is brought in line with the rolls. The bar is delivered onto this piler and from it is transferred to the hot beds.

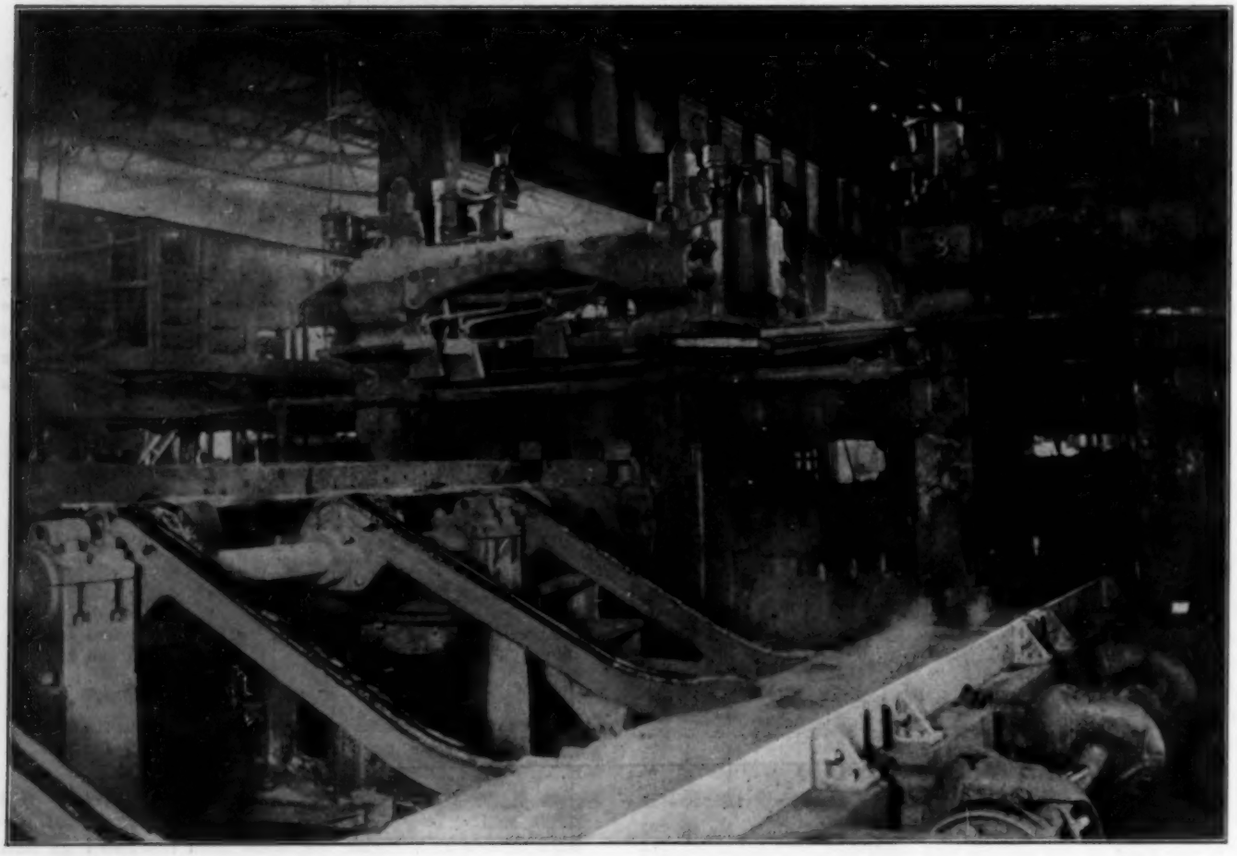
The rails are transferred from the hot beds to the finishing department by specially designed cars which deposit them on skids convenient to the straightening



HOT SAWS IN RAIL MILL.

machines. Two transfer cars are used, coupled together and hauled by a narrow gauge locomotive.

On top of these cars are two sets of arms mounted on



FINISHING ROLLS IN RAIL MILL.

are delivered onto hot beds where they are allowed to cool and straighten. In addition to rolling rails, the mill sometimes works on tin bars, and in this case the bar is

a shaft. Each set of arms is linked to a steam cylinder and all arms are controlled by valves on a manifold, which is attached to the end of the car next to the locomotive.

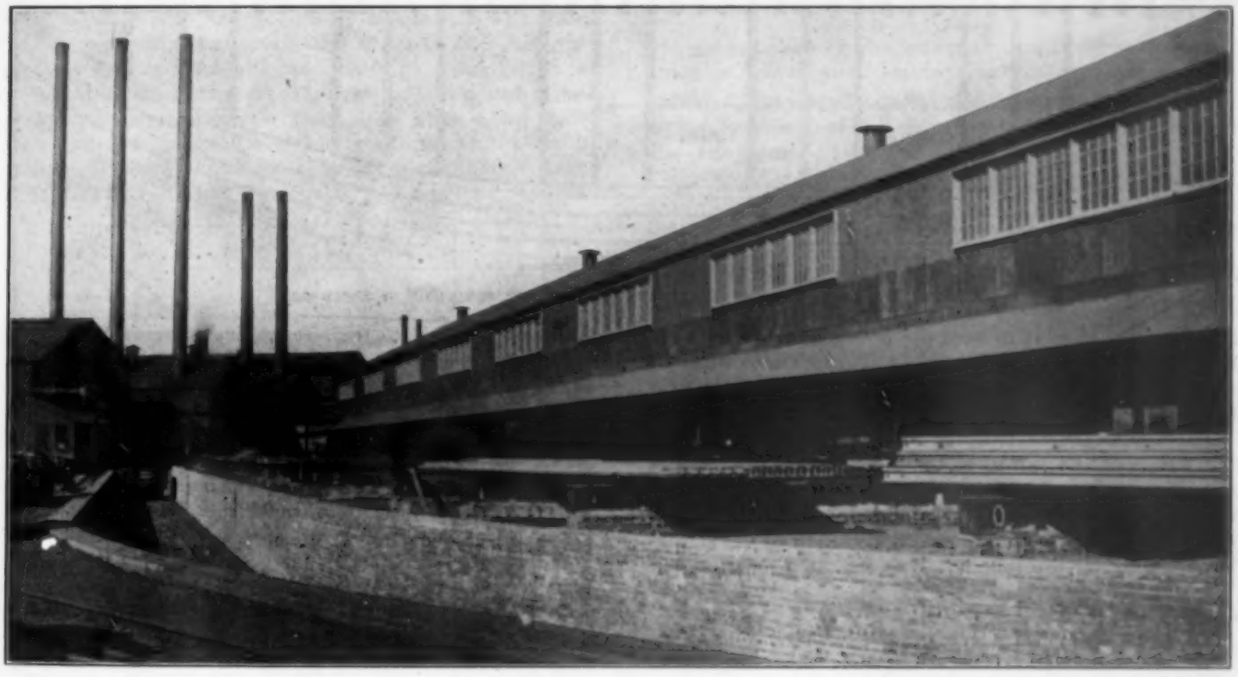
By admitting steam to the proper cylinder the engine driver can lift any set of arms and throw rails off on one side to the straightening beds in the finishing building, or on the opposite side to the storage beds.

of utilizing the limited space to the best advantage. A plan of the building is presented herewith and by referring to this plan it will be seen that this idea has been realized. The straightening and drill presses are all motor driven.

INTERIOR OF FINISHING MILL.

The steam for operating the various engines of the mill, including the blowing engine for the converters, is furnished by 22 Stirling boilers of 350 horsepower each. These are located in two batteries installed in separate buildings. The boilers are equipped with automatic stokers,

The cold saw is also driven by an electric motor. On the outside of the building, between the drill press beds and loading beds, there is a table for conveying the rails from one bed to another or to the cold saw and restraightening machines. The table is divided into two sections, each



EXTERIOR OF FINISHING MILL.

and coal is delivered in front of each boiler by means of an elevator which travels along one side of the boiler house and elevates the coal from the pit into which it is delivered from the railroad cars.

Rail Finishing Department.

This department was laid out with the idea in view

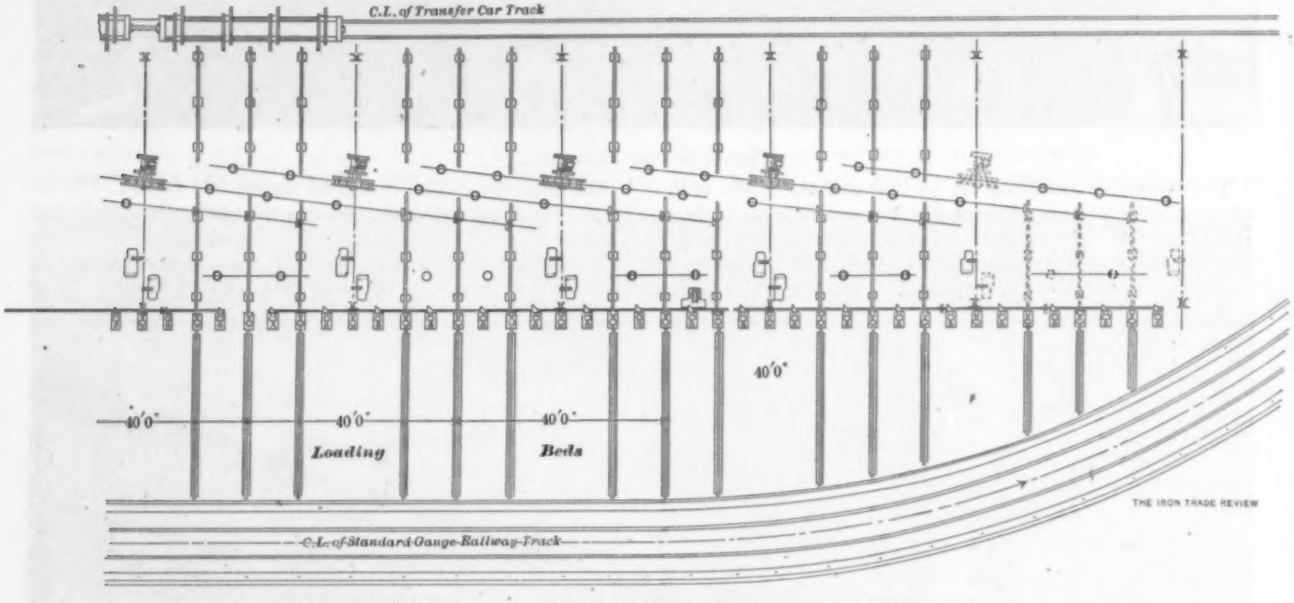
driven by an electric motor. Half of the rollers are driven and the other half are idle, thus allowing rails to be conveyed in opposite directions at the same time. The straightening presses are set on an angle with respect to the center line of the building. This reduces to a minimum all lifting and handling of rails. The rails for each

machine are taken from the bed immediately above it and placed on rollers from which it is fed to the machine. When it is straightened it is pushed along a set of rollers and delivered onto the bed opposite the next machine below. In this manner all the movements of the rails are accomplished on rollers and but little actual lifting is required.

All buildings of the rail mill are constructed of steel frame and corrugated iron. The lower portion of the building is removed in the summer time, making the building little more than an open shed, and giving the coolest place for the men to work in under the circumstances. In winter the open portions of the buildings are boarded up, thus protecting the men from the weather.

An interesting fact in connection with this mill is that construction was authorized at the stockholders' meeting in October, 1904, the first rails were rolled on April 22, 1905, and the engine driving the 28 inch mill was delivered in 87 days after placing the contract. Taking into consideration the fact that practically all foundations and machinery were put in place during the winter months, this work was done in remarkably short time.

The mill is capable of producing 1,800 tons of rails in 24 hours, although at present the production is about half of this, the other half being rolled into billets in order to supply the company's various merchant mills in the Mahoning valley.



PLAN OF LOWER END OF FINISHING MILLS, REPUBLIC IRON & STEEL CO.

The United Engineering & Foundry Co., of Pittsburg, Pa., designed and furnished the mills, tilting table, tables on delivery side of mill, hot and cold saws and rail hot beds. All other machinery was designed in the company's engineering department, under the direction of H. Z. Bixler, engineer for the Republic Iron & Steel Co.

Titaniferous Iron Ore.

The blast furnace is not suitable for the reduction of titaniferous iron ore. But in the electric furnace it is possible to obtain a final product containing a large or small percentage of titanium as desired. The advantage of the treatment of titaniferous iron ore, vast quantities of which exist in the United States, lies in the value of the by-products, particularly the ferro-titanium and titanium carbide.—[Engineering & Mining Journal.

THE REVERSIBLE AND IRREVERSIBLE TRANSFORMATIONS OF NICKEL STEEL.*

BY L. DUMAS.

The starting point for the investigations of which I am about to give an account is a well-known experiment of Prof. John Hopkinson's, which he published in 1889. A sample of nickel steel, containing 25 percent of this metal, which was non-magnetic at ordinary temperatures, became magnetic on being cooled to slightly below zero degrees C., and became highly magnetic at a temperature of —51 degrees C. On returning to the ordinary temperature it remained magnetic, and only ceased to be so at 580 degrees C. The steel was, therefore, capable of existing between the ordinary temperature and 580 degrees C. in two different states, characterized by the appearance or disappearance of magnetism, and, likewise, by different mechanical properties, the magnetic sample possessing a higher tensile strength and a lower elongation on fracture. The irreversible transformation of nickel steel has thus been described for the first time.

The following is a short history of the work done as a result of the discovery by Prof. Hopkinson:

Mr. Osmond, on subjecting several nickel steels obtained from Mr. Hadfield to trials resembling those of Prof. Hopkinson, found that the transformation undergone below zero degrees C. by a steel containing 25 percent of nickel was but a particular instance of a more general law. All the nickel steels which he studied possessed transformation points, by which are meant the points on the temperature scale at which transformation begins to occur on cooling, or finally disappears on heating. The temperature of these points became lower and lower in proportion as the percentage of nickel increased.

In Fig. 1 is shown the diagram in which Prof. Hopkinson collated the result of his experiment and allowed the progress of irreversible transformation to be followed. The abscissae represent temperatures, and the co-ordinates the magnetic induction under the influence of a fixed magnetizing force. Similar diagrams could be drawn for each sample of steel for the range comprised between zero percent of nickel and 25 percent of nickel, but the extent of the portion of the temperature scale, in which the steel can exist in two different

*An abstract of a paper presented before the Iron and Steel Institute, Sheffield, Eng., Sept. 26-29.

states, increase in proportion as the percentage of nickel rises and becomes practically *nil* above 25 percent.

Mr. Osmond has made a complete series of nickel steels varying from zero to 100 percent. He has determined their magnetic transformation points both upon heating and cooling, and the results are shown in Fig. 2. Above 25 percent of nickel the transformation becomes reversible. On the other

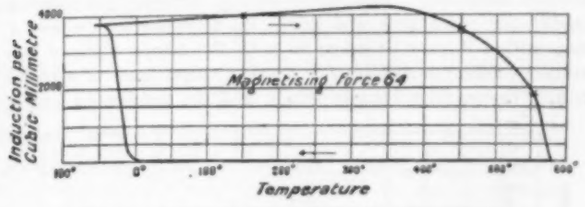


FIG. 1.—PROFESSOR HOPKINSON'S EXPERIMENT.

hand iron added to nickel rapidly raises its transformation points up to the moment when the percentage of nickel has been reduced to 70 percent, after which the transformation points become lowered, to reach zero degrees when the percentage of nickel has been reduced to 26 percent.

Steels Which Simultaneously Undergo Both Reversible and Irreversible Transformations.

The question under investigation by the author was, "Why is the lowering of the transformation point, on cooling—which renders steels, the percentage of nickel in which reaches 26 percent, non-magnetic in the vicinity of zero degrees C.—followed by an immediate rise of the transformation point above 26 percent, together with an alteration in the conditions of the transformation which, from having been irreversible before, now becomes reversible?"

In an experiment, when inducing transformations by cooling in liquid air, a sample containing 27.72 percent of nickel presented the peculiarity of being, in succession practically non-magnetic at the ordinary temperature, reversibly magnetic in solid carbonic acid, and irreversibly magnetic in liquid air. The same result was obtained with all steels of higher percentages than 25 percent of nickel up to 30.44 percent. It is, therefore, in the vicinity of 31 percent of nickel that it becomes necessary to place the limit, above which nickel steels no longer undergo the irreversible transformation. There is nothing, however, to indicate that this is an absolute limit. It appears to be certain that cooling at a lower temperature,

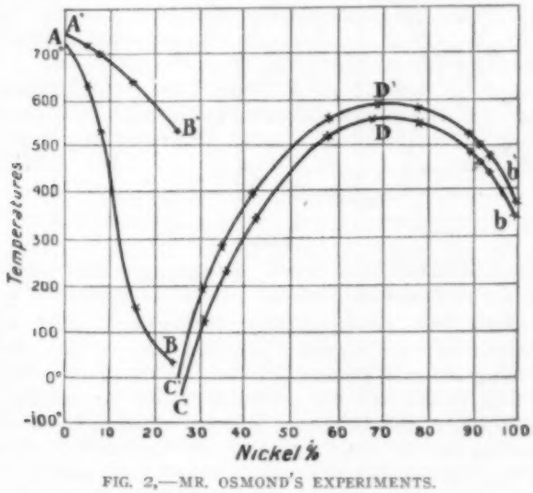


FIG. 2.—MR. OSMOND'S EXPERIMENTS.

for example, in liquid hydrogen, would again lower it by a few units. It would be interesting, however, to verify this.

The 30.44 percent nickel steel which commences to undergo irreversible transformation at about —100 degrees C. undergoes reversible transformation at about +100 degrees C. The irreversible cooling transformation point recedes farther and farther from the reversible transformation point as the percentage of nickel rises.

Action of Elements Other Than Nickel.

Other elements, notably carbon and manganese, have a great effect upon the irreversible transformation, and it is impossible to avoid taking these into account. It is necessary, in order to take into consideration the conditions under which the irreversible transformation occurs, to study the influence of the percentage of carbon and that of the percentage of manganese, apart from the influence of the percentage of nickel present.

Action of Carbon.—Carbon plays the same role as nickel, but with a far greater intensity, a unit of carbon producing the same amount of lowering as, on an average, 20 units of nickel.

In the earliest researches on nickel steel not enough regard was paid to the presence of carbon. Prof. Hopkinson's experiment could never have been performed had not the steels manufactured at that period been carbon steels. No nickel steels exist which are non-magnetic at ordinary temperatures, except steels containing carbon and manganese. According to the investigations of the author, the position of the point of transformation on the cooling of steel containing 26.34 percent of nickel, 0.063 percent of carbon, and 0.077 percent of manganese, is situated at 75 degrees C. A steel with 25

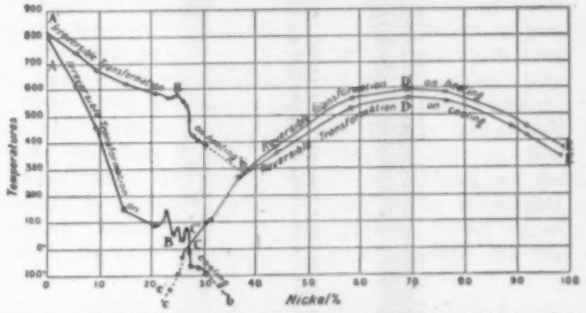


FIG. 3.—POSITIONS OF THE POINTS OF ALLOTROPIC TRANSFORMATIONS OF NICKEL STEEL, PERCENTAGES RANGING FROM 1 TO 100.

percent of nickel obviously has this same transformation point higher by about 100 degrees, when it is very low in carbon and manganese.

The presence of carbon does not affect the position of the reversible transformation points, thereby it considerably affects the divergence which exists between the point of irreversible transformation on cooling, and the reversible transformation point; the latter may thus be maintained higher than the former. This has enabled the author to demonstrate that steels with percentages of nickel below 26 percent can undergo the reversible transformation similarly to those in which the percentage is higher.

Influence of Manganese.—Similarly to nickel steels, manganese steels possess irreversible transformation points. Up to about 9 percent manganese steels are magnetic; the transformation point of a steel with 8.29 percent of manganese and 0.06 percent of carbon is situated at 175 degrees C. The transformation point of a steel with 10.83 percent of manganese and 0.29 percent of carbon, is situated at —78 degrees C.; this steel is non-magnetic at ordinary temperatures. The lowering of the transformation points by manganese is much more rapid than by nickel, while at the same time much slower than by carbon.

The Irreversible and Reversible Transformations are Distinct Phenomena.—The transformation points depend solely, as regards the reversible transformation, upon the percentage of nickel, but they depend, as regards the irreversible transformation, upon the percentage of carbon and manganese. Fig. 3 shows the determinations of transformation points in nickel steels of gradually increasing percentages of nickel, and of low percentages of carbon and manganese. The ir-

reversible transformation is shown by an unbroken line, up to 30.44 percent of nickel, and beyond this by a dotted line, this prolongation being hypothetical. The curves of the reversible transformation are likewise extended by dotted lines, this prolongation being to some extent imaginary, as this transformation for percentages has been determined for only percentages of nickel below 26 percent. It is important not to confuse the state of magnetism which arises from the irreversible transformation with that which results from the reversible transformation, the latter producing a much weaker degree of magnetism. Besides this, the very considerable modifications in mechanical properties, which have been described as manifestations of the irreversible transformation do not occur; the reversible transformation has no very appreciable influence on the mechanical properties of these steels.

Influence of Chromium.—Chromium is frequently introduced into the composition of nickel steels. The addition of chromium produces a considerable additional lowering of the irreversible transformation point, although it would appear at the outset that this metal is similar to carbon and manganese. This is not the case. From determinations of the positions of

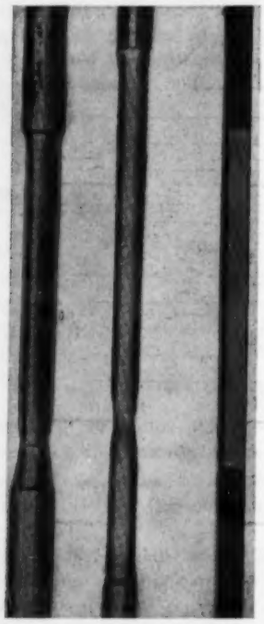


FIG. 4.—TENSILE TEST-PIECES OF 16 PERCENT NICKEL STEEL, ONE MAGNETIC, ONE NON-MAGNETIC.

the transformation points of a large number of steels containing chromium, it was concluded that chromium by itself exerted only a feeble influence on the position of the transformation points. A steel with 29.21 percent of chromium and no nickel, remained magnetic up to 585 degrees C.; a steel containing 2.74 percent of chromium, 17.24 percent of nickel, and 0.07 percent of carbon was magnetic at the ordinary temperature, whereas another steel with 0.87 percent of chromium, 19.56 percent of nickel, and 1.34 percent of carbon was non-magnetic. It must be concluded that the lowering of the transformation points of chromium steels is due to the action of the carbon rather than to that of the chromium; the latter simply renders the action of the carbon more intense.

Chromium also acts upon nickel when its proportion is high. None of the other elements which can be practically introduced into nickel steel has an influence to be compared with that of carbon and manganese.

Irreversible Transformation.

Comparative Study of the Properties of Nickel Steels at Different Temperatures.—An experiment by Mr. Guillaume consists in turning on a lathe a sample which has been heated to a temperature of about 700 degrees C. and placed on a lathe before its temperature has fallen below 150 degrees C. Under these conditions a steel with 16 percent of nickel shows itself soft to turn, and readily permits of the passage of the tool, yielding fine chips. If a magnet be brought near this sample during the time it is being worked, it is found that it is not attracted any more than cuttings taken from it. On the other hand it will be found that these cuttings, which cool rapidly, owing to their small size, soon become magnetic. The operation of turning takes place readily for some time and might be maintained thus for a long period if care be taken to keep the temperature of the sample above 150 degrees C. If the temperature is allowed to fall, the cuttings become brittle, and the turning no longer

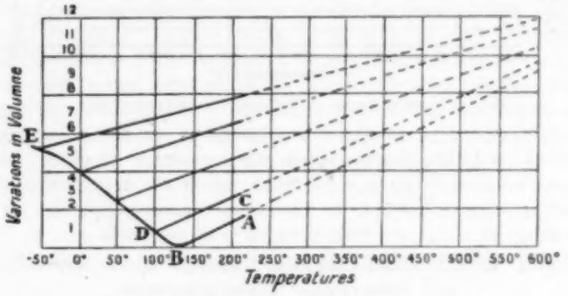


FIG. 5.—MR. C. E. GUILLAUME'S EXPERIMENTS.

takes place under favorable conditions, and cannot be kept up at the same speed. On bringing the magnet near the steel, it will be found to have become magnetic. The transition from the soft, non-magnetic state to the hard or magnetic state occurs at about 150 degrees C. if the nickel in the sample amounts to about 16 percent. Raising the transformation point is equivalent, to a certain extent, to lowering the temperature, and a simple method of obtaining information in regard to the physical and mechanical properties resulting from the irreversible transformation, is to vary the percentage of the nickel. The same effect is also obtained without any change in the percentage of nickel when carbon, chromium or manganese are added.

Modification of the Mechanical Properties.—Transformation has an important influence upon the mechanical properties—

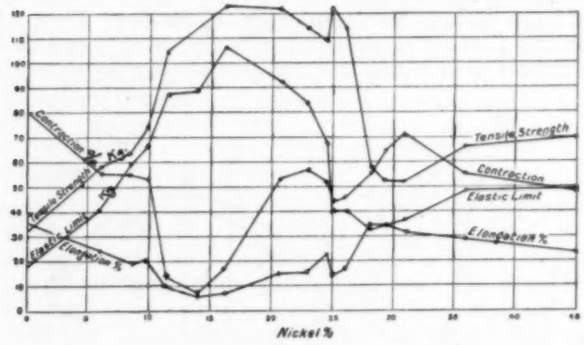


FIG. 6.— NICKEL STEEL PROPER. RESULTS OF TENSILE TESTS. TEST-PIECE FROM ROLLED, UNANNEALED BARS.

the elastic limit, tensile strength, brittleness to shock, and hardness. Let two test-pieces of nickel steel be taken, each containing about 16 percent of nickel, one of which contains but little carbon and no chromium which has undergone transformation, and the other a high percentage of carbon and chromium and be tested comparatively for tensile strength. The chemical composition of the two steels is as follows:

COMPOSITIONS OF STEELS.

	C	Mn	Cr	Ni
Magnetic steel	0.16	0.13	..	15.92
Non-magnetic Steel	0.53	0.83	3.02	16.05

The first sample undergoes deformation at one place only, that is at the point at which fracture will take place. The greater portion of the test-piece remains intact, and as bright

as when it left the lathe. This is shown in Fig. 4. The second test-piece undergoes a preliminary deformation throughout its whole length, preceding that which occurs in the vicinity of the fracture. It is thus reasonable to distinguish two phases as occurring in the deformation of this second steel, while only one, the second, was found in the deformation of the first steel. The result of these tests is shown in the following table:

RESULT OF TENSILE TESTS.

	Elastic limit in Kilogrammes.	Tensile strength in Kilogrammes.	Elongation percent.	Contraction percent.
Non-magnetic steel	76.2	89.2	19	54.5
Magnetic steel	32.8	77.5	73	68.0

The elastic limit of the first steel closely approximates to its tensile strength, being 87 percent of the tensile strength. The elastic limit of the second steel is only 42 percent of the tensile strength. This explains why in the latter the deformation which leads to breakage is preceded by a preliminary deformation, during which the elastic limit is reached. The portion which earliest undergoes deformation under stress soon ceases to elongate, because its elastic limit has been reached. Another portion then undergoes deformation in turn, and this process is repeated throughout the whole length of the test piece, even to the ends, despite their large diameter, until the limit of elasticity has been reached throughout the whole limit of the test-piece. This effect may be caused beforehand and by subjecting the steel to the drawbench. In this case the earlier phase disappears. The following are the results obtained by tensile stress on a test-piece derived from the same bar of steel, containing 28 percent of nickel before and after cold drawing.

RESULT OF COLD DRAWING.

Treatment of the Test-piece.	Elastic limit in Kilogrammes.	Tensile strength in Kilogrammes.	Elongation percent.	Contraction percent.
Before drawing	32.1	57.8	34	55
After drawing	92.1	92.1	11.7	63.5

The passage through the drawbench has made this steel lose the property of undergoing preliminary deformation, and the fracture occurs under the same conditions as with the 16 percent nickel steel which had undergone irreversible transformation. The conclusion is that this transformation and the effect of working are equal from the point of view under consideration, both having the effect of raising the elastic limit and tensile strength by making them closely approach each other.

That these results are equal are shown by the following comparative tensile tests which were obtained with test-pieces cut from a bar of non-magnetic steel at the ordinary temperature, containing 23 percent of nickel and a little chromium.

TREATMENT OF TEST-PIECES.

Treatment of the Test-piece.	Elastic limit.	Tensile strength.	Elongation percent.	Contraction percent.
Neither drawing nor cooling..	30.9	71.8	35	41.5
Cooling at —78.....	102.6	137.0	20.3	21.5
Drawing	129.5	139.0	13.3	28.2
Drawing and cooling.....	141.5	149.0	12.7	32.1

The second test-piece shows, after cooling, a rise in elastic limit from 30.9 kilogrammes to 102.6 kilogrammes. The third test-piece undergoes, after working, an increase of elastic limit to 129.5. The increases in the other pieces are 71.7 and 98.6 kilogrammes respectively. The two treatments combined only give an increase of 110.6 kilogrammes. Their effects, therefore, are not additive but complementary; thus the allotropic irreversible transformation produces a sort of internal working.

Sudden Alteration in Volume.—One of the most characteristic manifestations of the irreversible transformation which takes place in a non-magnetic steel, or in a steel rendered magnetic by the reversible transformation, is a sudden alteration in volume which occurs in an opposite way to that usually resulting from the thermal laws of contraction of bodies; that is, an increase in the volume on cooling. The author conceives that, when nickel is added in gradually increasing quantities, the molecules of the nickel intersperse themselves among the molecules of iron, and compress them more and more as the proportion of nickel rises. From this there arises a "working" effect, evinced by a progressive increase in the elastic limit. But to this period of gradually increasing internal tension succeeds a second period commencing when the percentage of nickel reaches 20. Above this percentage the iron contained in the steel gradually changes its state, the volume of the molecules diminishes and the pressure to which they are subjected disperses, and ductility reappears. Results of analysis of the progress of this phenomena under the influence of cooling are shown in Fig. 5. The steel whose variations were investigated in this experiment contained 15 percent of nickel.

The diagram shows that a lowering of the temperature 130 degrees C. below its point of transformation on cooling increases the volume instead of diminishing it in accordance with the general laws of the contraction of bodies.

Alteration of Structure—When a polished sample of nickel steel is subjected to a degree of cooling sufficient to partially transform it, it is found that the portions which have been transformed project above the original surface; they are those which have passed into the condition of martensite. This tends to confirm the view that the transformed portions, on taking form compress those adjacent to them or "work" them. The sudden alteration in volume and the alteration in physical properties appear to be inseparably connected. There is, on the other hand, a perfect correspondence between the modifications in structure and the mechanical properties.

The irreversible transformation takes place with a considerable evolution of heat which is an indication of a considerable degree of mechanical work within the interior of the mass. Although of considerable importance this evolution of heating is relatively but little appreciable when the percentage of nickel is high, because of the slowness with which transformation takes place as the percentage of nickel rises.

The Reversible Transformation.

While this transformation has no influence on the mechanical properties, and does not produce any sudden alteration in volume, nor any modification in structure resembling that accompanying irreversible transformation, the reversible transformation exerts important influences on physical properties other than those of the magnetic state already instanced. The most important of these influences is that which it exerts on the coefficient of dilation. This coefficient diminishes considerably on the steel undergoing reversible transformation on cooling, and when a steel contains 36 percent of nickel is becomes *nil*. The influence of the reversible transformation on dilatation is incomparably greater than that of irreversible transformation.

Mechanical Properties of Nickel Steels and Effect of the Irreversible Transformation.

The result of a large number of tensile tests on nickel steel are shown in Fig. 6. On comparing this diagram with the diagram shown in Fig. 3, which permits one to take into account the positions of the transformation points it will be perceived that the variations in the mechanical properties of these steels correspond very accurately with the variations in the molecular state arising from the irreversible transformation. The elastic limit and the tensile strength gradually increase in proportion as the percentage of nickel

increases, while the elongation diminishes. A steel with 15.92 percent of nickel yielded:

Elastic limit in Kilogrammes.	Tensile strength in Kilogrammes.	Elongation percent.	Contraction percent.
107	123	6.7	16.4

Above 15 percent of nickel the elastic limit begins to fall, but the tensile strength is maintained.

A steel containing 20.52 percent of nickel tested as follows:

Elastic limit in Kilogrammes.	Tensile strength in Kilogrammes.	Elongation percent.	Contraction percent.
92	122	14	53

With more than 21 percent of nickel the elastic limit and the tensile strength both undergo a sudden fall while the elongation increases rapidly. This period is that of the transition of the transformation point on cooling to below the ordinary temperature. A tensile test with steel containing 27.72 percent of nickel as follows:

Elastic limit in Kilogrammes.	Tensile strength in Kilogrammes.	Elongation percent.	Contraction percent.
92	122	14	53

Above 27 percent of nickel only slow alterations in the mechanical properties are found. This strongly demonstrates the importance of the changes in the molecular state induced by irreversible transformation. It is also found that the reversible transformation has no influence on the mechanical properties. The influence of the reversible transformation is almost negligible to the metallurgist. It is necessary, however, to be able to recognize it, in order to be able to distinguish it from that of the reversible transformation in magnetic transformations.

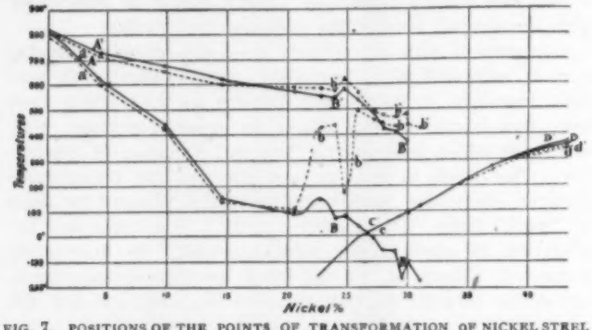


FIG. 7. POSITIONS OF THE POINTS OF TRANSFORMATION OF NICKEL STEEL WITH PERCENTAGES RANGING FROM 0 TO 45, BEFORE AND AFTER QUENCHING AND WORKING.

ABB, curve of irreversible transformation points on cooling, before quenching and working.
abb, curve of irreversible transformation points on cooling, after quenching and working.
A'B'B', curve of irreversible transformation points on heating, before quenching and working.
a'b'b', curve of irreversible transformation points on heating, after quenching and working.
CD, curve of reversible transformation points on cooling, before quenching and working.
cd, curve of reversible transformation points on cooling, after quenching and working.
C'D', curve of reversible transformation points on heating, before quenching and working.
c'd', curve of reversible transformation points on heating, after quenching and working.

Among steels the transformation point on cooling is below the ordinary temperature. The following steels contained 25 percent nickel, 2.5 percent of chromium and 0.8 percent of carbon, and 0.5 percent of manganese. They tested as follows:

	Elastic limit in Kilogrames.	Tensile strength in Kilogrammes.	Elongation percent.	Contraction percent.
Unquenched	81.7	107	36.2	58.5
Quenched	38.7	89.3	95.0	68.0

Effect of Ordinary Physical Treatment Upon the Behavior of the Transformations.

The previous experiments were all made upon bars leaving the rolling mills while hot, they having undergone neither annealing, quenching, cold working nor any other working. The effect on the steels of such treatments is considerable.

Transformation Points of Steels Which Have Undergone Physical Treatment.—Any one of the above treatments raises in which this point is in the neighborhood of the ordinary temperature. Thus, certain steels which do not undergo transformation in solid carbonic acid, or liquid air, become transformed when they have been quenched, worked or annealed. It must be concluded that the molecular equilibrium of these steels depends, not only on the percentage of elements other than iron which they contain, but also on the physical treatment which they have undergone. Fig. 7 shows the positions of the transformation points of various nickel steels which have been quenched and worked. These are the same samples which furnished the data for Fig. 3. The dotted curves show the results of the new observations; the continuous lines are a reproduction of the curves shown in Fig. 3. The diagram shows that steels with more than 21 percent of nickel undergo a rise in the point of irreversible transformation on cooling, which may be sufficiently high to approximate this point very closely to the point of transformation on heating, which is itself, slightly raised. For percentages lying between 15 and 21 quenching and working produces practically no effect. Below 15 percent of nickel these operations only produce a slight lowering of the two transformation points without causing them to approach each other.

Effects of Physical Treatment on the Mechanical Properties of Nickel Steels.—Steels which have undergone the irreversible transformation are almost insensitive to the action of quenching or working or even to annealing at 800 degrees C. Steels whose transformation point is situated below the ordinary temperature before treatment are extremely susceptible. The effects of work on a steel are similar to the effects of irreversible transformation, while the effects of "working" produced by exterior action are easily destroyed by annealing at 900 degrees C., those of the transformation are in no way affected. By drawing, compression, forging or by rolling, etc., the limit of elasticity may be raised until it reaches that of transformed steel, and may even, in certain cases, exceed it. The resistance offered to drawing in a bench by a square bar of 2,025 square millimeters section, which had undergone one pass, reducing its section by about one millimeter, became on the second pass of the same draft, sufficiently high to break the four drag bolts of 30 millimeters' diameter, by means of which the tensile stress was applied. The surface hardness had become comparable with that of the hardest quenched carbon steels.

Deformation in the cold has, as a result, the production of internal stresses which may attain an extraordinary degree of intensity. In planning a square 46 millimeter bar which had been worked in the press, the bar buckled at each pass with such intensity that it was extremely difficult to keep it on the planing-table. Each cut made altered the molecular equilibrium, which was only restored by the buckling of the bar. These internal stresses may, by employing a powerful method of forging, become sufficiently intense to disrupt the metal at the points of maximum deformation. These irregularly distributed internal stresses do not occur in steels which have undergone transformation; the internal action of the stress is uniform and produces uniform tension. Working, when it produces hardness in carbon steels, acts chiefly upon the superficial layers. It is therefore unsuited for conferring great hardness upon pieces which possess some thickness. This explains why pieces that have been worked are relatively only slightly brittle, nothwithstanding the existence of internal stresses.

Quenching.—In the case of nickel steels the action of quenching like that of annealing, appears to be exclusively of a physical order while the resulting molecular state is so stable that it withstands repeated reheatings. Comparative tensile tests show that quenching after heating to 900 degrees C. hardens steels somewhat which have undergone transformation, and on the contrary considerably softens those which have not been transformed. In the latter the effect produced is not only a lowering of the elastic limit

and tensile strength, together with an increase in elongation, but also a change in the appearance of the test-pieces after they have undergone stress; their surface becomes rugged and scaly and displays tears.

Annealing.—Annealing at 800 or 900 degrees C. produces an effect similar to that of heating to the same temperature as before quenching, but the action is less marked. Certain steels are highly sensitive to the influence of annealing at a low temperature (true tempering), such as heating to a temperature of about 400 degrees C., which softens nickel steels with high elastic limits, as it does quenched carbon steels. The effect produced depends upon the position of the point of transformation on cooling. When the steel is raised to a temperature above that of this transformation point it passes into the non-magnetic state, but when it is raised to a high temperature, without exceeding that of the transformation point, it remains in the magnetic state. The result of the tensile tests recapitulated above demonstrate that, in the first case, the hardness of the steel increases, whereas, in the second case, it is considerably diminished. This property has been proved to belong to a steel with 12.5 percent of nickel, but it is common to all steels which have undergone the irreversible transformation.

Conclusions.

1. Nickel, manganese and carbon introduced into a steel determine alike the appearance of the same phenomenon, irreversible transformation, which is more intense the higher the proportions in which they are present.

2. It is not sufficient that they should be present in the steel; it is necessary, besides, in order that they should exert the full effects they are capable of, that they should be in solution, a state which is often, as regards carbon, impossible of attainment without the aid of chromium.

Nickel steels present the most perfect examples of a state of solution known. It has never been possible to detect in these steels the slightest segregation; no physical treatment appears capable of destroying their homogeneity, and yet they are not chemical compounds of definite composition. It would seem that chromium nickel steels realize in the most perfect manner known, what is termed solid solution.

The properties of nickel steel are the same as those of iron modified, and even exaggerated by the influence of elements it holds in solution, yet at the same time, perfectly recognizable, particularly that of undergoing allotropic modifications. The movement of the molecules is hampered by the presence of nickel or of other elements. Swedish iron, at the temperature of liquid air, becomes extremely brittle, but it recovers its toughness on returning to the ordinary temperature. At the same temperature the nickel steel has lost very little of its tenacity because the nickel impeded the movement of the molecules and prevented them from forming crystals.

The highly remarkable properties of those nickel steels which have not undergone the irreversible transformation have occupied the principal place in this paper. Because of their high percentages of nickel they are, unfortunately, so costly to produce that they are beyond the range of current industrial application. It would seem, therefore, at first sight that a minute study of their properties was almost useless from a practical point of view. The direct utility of these investigations is, perhaps, greater than might be apparent at first sight, but they possess an indirect utility of prime importance in showing the nature of the operation involved in adding nickel to steel. Two effects are produced: the homogeneity is increased, and a form of what is otherwise known as "working" results; the condition of mutual solution is improved. With very low percentages the first effect predominates, the crystallization of the iron is impeded and the brittleness lessened. The action of the nickel is analogous to that of a quenching carried out at 1,000 degrees. It may be remarked in passing, that it is much more practicable to introduce nickel than to quench when large masses are concerned.

ANNUAL GUARANTEE.

New Plan of Security Finds Favor With Government Bidders.

WASHINGTON, Nov. 6.— There is a growing disposition on the part of machine tool manufacturers, shipbuilders, iron and steel supply houses and other firms doing business with the war and navy departments of the government to adopt the practice of filing at Washington what are known as "annual guarantees," and this is a procedure which, for the best interests of the bidders on government contracts, cannot be too strongly commended.

Under existing conditions any bidder upon a contract to be awarded by the war and navy department must file with his proposal a guarantee, properly executed by a United States officer or notary public guaranteeing that should his proposals be accepted for any one or more of all the schedules offered he will within 10 days after the receipt of notice of such acceptance, execute the required contract for the transaction and give bond with good and sufficient surety. Or, if a bidder does not file such a guarantee with each and every proposal, a certified check for the full amount of the proposal must accompany the bid.

Any failure to accompany a bid with a guarantee or certified check prevents the proposal from being considered, and there is not a week but what the department officials throw out as "informal" bids which in many instances would otherwise win contracts.

The alternative of the certified check has the disadvantages that it is liable to be mislaid or lost, or that there is very often considerable delay in its return in case the bid is unsuccessful.

As a solution of these problems which are so serious that very often the loss of a contract is involved the more far-sighted firms are now having recourse to the annual guarantee, and more than 200 of the most prominent firms doing business with the government are now protected in this manner. The annual guaranty is executed by any bonding or guaranty company authorized to act in this manner—this includes all the leading companies—and is in substance a duplicate of the individual guarantee above mentioned, save that it covers any and all bids submitted during the year by the firm or individual in whose favor it is drawn.

Naturally the department officials are warmly in favor of this plan since it not only simplifies their work in opening and considering bids, but also spares them much dissatisfaction on the part of bidders whose proposals are thrown out because of some slight technicality.

The cost of execution for such annual guarantees is understood to be very moderate, the fees of the bonding companies in some instances not exceeding $10 or $15 per year. This service merely affords a guarantee that a contract will be entered into if a bid is accepted. It does not constitute a bond for the fulfilment of a contract if awarded. The latter is an after-consideration and is separate and apart from the preliminary protection exacted by the government.

Needs of the Navy Yards.

The United States navy department will on Nov. 21 open bids for a number of machine tools and other items of equipment for Pacific coast navy yards.

Among items for which proposals are invited with stipulation for delivery at the Mare Island navy yard, California, are the following: One 5-h. p. wholly inclosed 220-volt, shunt-wound, direct-current motor to drive a 16-in. pulley on countershaft at 400 revolutions per minute; speed of motor not to exceed 1,500 revolutions per minute, one motor and all necessary attachments for convert-

ing a 32-in. Lodge & Shipley lathe to direct motor drive; two self-feeding ripsaw tables, motor driven; one No. 2 die-sinking machine as made by the Pratt & Whitney Co., Hartford, Conn.; and one surface-grinding machine suitable for surfacing work at least 50 in. long, 14 in. wide and 11½ in. high and under, complete with countershaft, tight and loose pulleys and all accessories. On the same date bids will be opened for furnishing for the Mare Island yard one double-cylinder, double-friction, drum hoisting engine, complete with boiler and all accessories and four independent winch heads.

On Nov. 14 bids will be opened by the navy department for a number of articles of equipment for the League Island navy yard at Philadelphia. These include one magnetic metal separator and dynamo, complete; one self-emptying oil separator; one 4-in. pipe-cutting and threading machine, electrically driven, 220 volts, inclosed type motor, to cut from 1 to 4 in.; 3-in. hollow hexagon turret lathe; one open side planer, and two turntables for portable railway track.

On the same date proposals will be considered for the furnishing of one tenoning machine and one automatic cut-off saw for wood for use at the navy yard at Norfolk, Va.

PHILADELPHIA MACHINE-TOOL MAKERS

Find Business Heavy Both for Domestic and Foreign Trade.

PHILADELPHIA, Nov. 6.— A general review of the manufacturing interests in the machinery business in Philadelphia would apparently indicate that trade as a whole is in a flourishing condition. Orders are well up to the average and in some instances the volume of business is greater than has ever before been known. Certain manufacturers report inability to meet with the demand owing to the failure of the lathe builders to make prompt delivery, and as a consequence shipments for the near future will be considerably delayed.

Philadelphia manufacturers are getting their share of foreign business, and in many instances negotiations now under way point to a favorable conclusion. While the majority of concerns are working their full quota, others report running overtime with no prospects of decrease in the amount of business for the next six months.

A number of additions have been made to various plants, some of which are still in course of erection, and new equipment is being installed, which would substantiate the general outlook.

The Baldwin Locomotive Works reports almost 17,000 men on the pay roll, with sixty percent of the force running day time and forty percent on the night shift. Present conditions appear to be favorable and a larger amount of business is being done now than ever before. The demand is healthy, and indications point to a good business for the coming year.

Tool Demand is Healthy.

The Fairbanks Co., which is one of the largest supply houses in the machinery line, states that there has been a very healthy general demand for all classes of tools. This company is placing orders anticipating that business will be good throughout the year 1906. Large size gear cutters are selling very freely and it is impossible to keep up with the supply. New equipment is being installed for the purpose of taking care of the larger units in the pipe shops, there being an enormous demand for fittings and pipe specialties. A new catalogue, which is now on press, will be issued during the latter part of December or early in January, 1906.

The Nazel Engineering & Machine Works is working full time, as is customary with this concern the year round, and it reports that business is booming at present with no prospect for decrease in the immediate future. It is now turning out a contract for the Pennsylvania Railroad Co. for a large double head centering machine for centering locomotive axles, and negotiations with a Mexican firm are nearing completion for the building of special machinery which is to be used for extracting fibre from a Palma leaf. The approximate amount of business on hand is estimated at about $20,000. This company keeps two draftsman constantly employed on special machinery design work and is now running thirty machinists. Two radial drills, a lathe, planer and cutting-off machine have been recently added to the equipment.

Tinius Olsen & Co., manufacturers of testing machinery and presses, have filled more orders this year than ever before, and report enough business on hand to keep busy for the next six months. They are working fifty-eight hours a week and have contracts at present amounting to about $30,000, of which sum $4,000, is for foreign trade. Within the next two months they expect to issue a catalogue of one hundred pages or more, which will be fully illustrated.

Mr. James Thompson, proprietor of the Philadelphia Iron Works, states that his firm has just completed the erection for the J. B. Stetson Co. of one of the largest self-supporting steel stacks built in this country. The dimensions of this stack are 200 ft. high, 13 ft. in diameter, with a bell 23 ft. in diameter and 25 ft. high. It has also installed three large power tanks at Bristol, Pa. This firm is working overtime and running about 120 men, with no prospect for a depression in business. An addition has been made to the erecting shop at Eighteenth street and Pennsylvania avenue, and the equipment increased with a 150-ton hydro-pneumatic riveter, complete with over-head electric traveling crane.

Busy With Prospects Good.

Mr. Wilfred Lewis, president of the Tabor Mfg. Co., says that business conditions are good and that its force of 120 men is running full time, with prospects favorable for the next six months. Its specialty is molding machines and saws. A new 150-H. P. boiler is one of the recent additions to the equipment.

H. B. Underwood & Co., general machinists, and one of the largest manufacturers of portable tools for railway repair shops, has made a recent addition of two stories to its building, increasing the floor space about forty percent, and report working full time with an average of 50 men. It has lately installed a 10-in. Bement slotting machine and is turning out a large amount of work on refrigerating plants and radiators. Considerable foreign business is being transacted through commission houses in New York.

Watson & McDaniel, large manufacturers of steam specialties, say that business is booming at the present time and that they are turning out large quantities of steam traps and pump governors. Their new factory with all modern improvements has just been completed, and among the new installations might be mentioned a large turret lathe and radial drill. This firm runs full time practically throughout the year.

Williamson Bros. Co., an engineering firm, catering to the shipbuilding industry, is running 325 men full time, but is unable to report encouraging prospects at this time of year. Among the larger contracts on hand is a New York Edison condensing outfit. The molding shop is among the number tied up on account of the strike, and the company is unable to state that an immediate settlement of the difficulty will be made. The men are still out.

IN NEW YORK MACHINERY CIRCLES.

General Prosperity and Satisfaction Reported—All Lines are Sharing.

NEW YORK, NOV. 6.—No better evidence of prosperity in the trade could be found than the proposals to advance prices which have occupied the attention of machinery men lately. In dull times such topics receive small consideration. The meeting of the National Machine Tool Builders Association, held at the Hoffman House during October adjourned without taking definite action on the question of prices, but a substantial advance in several lines is quite within the range of possibilities. Already the builders of milling machines have marked up quotations 5 and 10 percent, and if deliveries are to continue to lengthen out into the future, premiums will soon be in evidence.

During the month of October and the opening week of November the demand for all classes of machinery has been exceptionally good. Not only has there been a remarkable activity among the railways in refurnishing shops, but a very large proportion of the independent manufacturers are increasing their capacity to be in readiness for the rush of business which is confidently expected. Many of the local representatives complain that they cannot secure prompt shipment, and several of the leading shops are working overtime. Even the single member of the trade who would not admit to an *Iron Trade Review* scribe that conditions were anything more than normal confessed to a stretching of working hours until nine o'clock in the evening.

Purchases and Inquiries.

The following companies have been making purchases or issuing inquires during the month. The New York Central Railroad, for machinery which will be required before the end of the year; The New York, New Haven & Hartford, for delivery during the same period; two lists issued by the Pennsylvania Railroad, one for the Union Railway Division and the other for the Altoona Locomotive Testing Plant; The Mississippi Central for the Hattiesburg shops; the Allis-Chalmers Co., equipment for its various plants; and considerable quantities of machinery and tools for the American Locomotive Co., the American Can Co., The W. P. Davis Co., of Rochester and a great number of machine shops and foundries which are erecting new buildings or increasing their capacity in other ways.

Manning, Maxwell & Moore, Inc., report that the sales during October have been even better than those of September. The railroads are still buying heavily and are expected to continue in the market for some months to come. A good demand for power plant supplies indicates that much new construction is under way. A feature of the export trade was increased shipments to Germany and Italy, consisting mainly of smaller tools and including milling machines, lathes, shapers, etc.

Deliveries are Lengthening.

The agents of the Niles-Bement-Pond Co. are using as an argument to persuade reluctant customers the steady lengthening of deliveries. Some of the shops are months behind and are working into the night to catch up. The firm's "Progress Reporter" which appeared last week contains descriptions of a number of new machines recently completed or in process of construction. Among the number are a 16-ft. extra heavy boring and turning mill, one of thirteen recently shipped to the General Electric Co. for their new turbine shop; a large rifling machine for use in small arms manufacture, a Pratt & Whitney splining machine, one of the thirty built for European arsenals; a large gun barrel drilling machine; a motor driven turret lathe; an ingot slicing machine; a new radial drill for general work; a new style of electric hoist; and several other special machines for heavy service.

The Vandyck-Churchill Co. has secured a number of good orders out of railroad business offered during the month. One independent shop in New Jersey purchased eight geared-head, motor-driven lathes, A goodly number of Higley saws have been sent to buyers in the West. The firm is enlarging its quarters on Dey street, New York. The offices are to be moved to the floor above and the present ground floor space will be used for the display of a larger stock.

Comments on the Trade

J. J. McCabe finds no favorites in the business of the month, all lines of machinery sharing equally in the general prosperity.

The Eastern & Export Department of the Pratt Iron Works, reports that business in October has been better than any other month of the year surpassing September by a good margin.

Schuchardt & Schutte, who supply pliers and other small tools to machine shops, have had a better month than for some time past.

The Prentiss Tool & Supply Co. experiences no difficulty in selling more goods than it is possible to deliver.

Hill, Clarke & Co. report exceptionally heavy sales of a new model Flather lathe and also of a new milling machine which is practically sold out as far ahead as March, 1906.

The American Woodworking Machinery Co. has discovered no boom in any quarter but numerous small orders make up a very satisfactory aggregate. The conditions seem to indicate a unanimous decision to buy among customers who had been hesitating.

A. & F. Brown Co. has recently experienced an excellent export trade in power transmission material. The demand from South America, although good, has not been better than that from South Africa, Australia or Japan.

New and Old German Tariffs.

The Monthly Summary of Commerce and Finance for August, issued by the Department of Commerce and Labor through its Bureau of Statistics, contains the complete German customs tariff, giving a comparison of the rates of import duty levied in Germany under the old and new customs tariffs, respectively. As regards manufactures, the old rates are for the most part moderate. The duty on sewing machines, representing the highest ad valorem rate under the existing tariff among important articles of export from this country, viz., 22 percent, is raised 46 percent (i. e., to about 32 percent ad valorem) under the new general tariff, no provision having been made under the conventional. Agricultural machinery, which pays on the average about 4 percent ad valorem, will be subject to rates from 20 percent to 88 percent higher (according to the weight of the machine), so that the ad valorem rate under the new general tariff will range from about 5 percent to 15 percent, with no provision for conventional rates. The rates of duty on steam engines and motors of all kinds, which were hitherto the same as that on agricultural machinery, and averaged 4 percent ad valorem, are advanced all the way from 40 percent to 1,150 percent (according to weight) in the new general, and from 40 percent to 837 percent under the new conventional. In other words, motive machinery coming from countries not enjoying the conventional rates will be subject to duties as high as 50 percent ad valorem, while that coming from favored nations will pay duties ranging from 5½ percent to 35 percent ad valorem.

WHY THE LAP-JOINT FAILS.

The annexed engravings show almost at a glance why the lap-joint is so apt to develop cracks between the sheets. In the first place the sheet is shaped into its circular form by being passed through rollers, as in Fig. 1, but as there is considerable distance between the roller centers they are unable to continue the bending process clear to the end of the sheet, and it would fit together something as is shown in Fig. 2.

The sheet has to be gotten into a circular shape at these edges by being sledged over a former. As it is much easier to punch the rivet holes while the sheet is flat this has already been done, and if incipient cracks are started by the mauling process in the already weakened sheet, or if the minute cracks which sometimes radiate from the punched holes are extended beyond the range of future reaming it is not to be wondered at.

In a 72-in. boiler with 90 lb. pressure and rivets pitched 2¼ in., the conditions at the recent Brockton explosion,

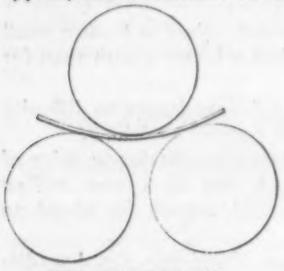


FIG. 1. BENDING THE PLATE.

FIG. 2. HOW THE PLATES FAIL TO MATCH.

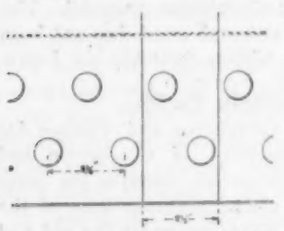


FIG. 3. SECTION OF PLATE EMBRACING TWO RIVETS.

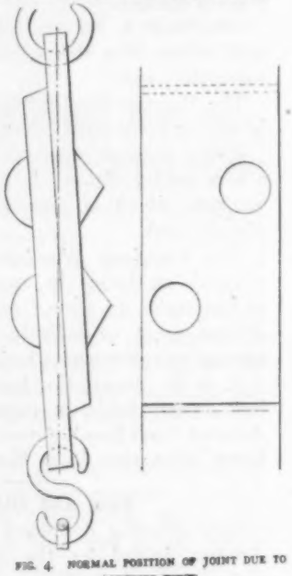


FIG. 4. NORMAL POSITION OF JOINT DUE TO EXTERIOR PUNCH.

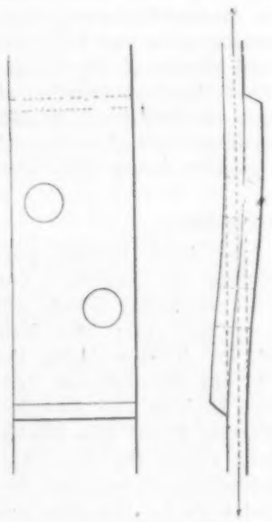


FIG. 5. STRAIN DUE TO EFFORT OF PLATES TO LINE UP.

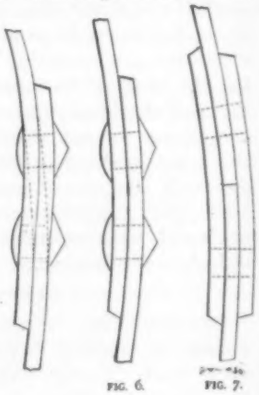


FIG. 6. FIG. 7.

WHY THE LAP JOINT FAILS.

there would be a force of over 3¼ tons pulling on a strip 2¼ in. wide; i. e., wide enough to include one rivet in each row, as in Fig. 3. It will be seen that if such a weight were suspended upon such a strip, as in Fig. 4, the center of gravity of the weight would hang under the point of suspension which would tend to bend the plate into the form shown in Fig. 5, and the flexure would naturally take place along the line weakened by the rivet holes. If any crack existed there it would tend to extend it. In the boiler the shell tends to assume a cylindrical form which exaggerates this effect as shown in Fig. 6.

A joint made of a ductile metal like lead would stand such treatment without injury; a joint made of glass would fracture very soon. If the boiler plate is very ductile it may never give any trouble; if it is brittle it will be all the more liable to have sustained injury in the mauling process and will yield all the sooner to the repeated application of this force, and perhaps greater ones due to unequal expansion, until the crack extends beyond the capacity of the yet uninjured metal to bear its unequal share of the load.

The crack, in the nature of things, develops on the inside of the joint, where it is not discoverable by any practicable form of inspection. The interior of a butt-strapped joint is equally inaccessible to the inspector, but with it the shell can take the true cylindrical form without any tendency to distort the sheet, as shown in Fig. 7.—[Power, October, 1905.

Bids on Field Gun Carriages.

(Special Correspondence.)

WASHINGTON, Nov. 6.—The Bureau of Ordnance of the War Department has just opened bids for another contract covering 20 3-in. field gun carriages of the model of 1902. The Driggs-Seabury Ordnance Corporation submitted a bid of $3,200 per carriage, one carriage to be delivered in 10 months and the others at the rate of two carriages per month thereafter. The American & British Mfg. Co. bid $3,010 per carriage, delivery of the first carriage to be made in nine months and the remaining 19 carriages to be delivered in seven months after the date of first delivery. The U. S. Rapid Fire Gun & Power Co. entered a bid of $4,332 per carriage, promising delivery of the entire order in 24 months. The Bethlehem Steel Co., on a bid of $3,845.39 per carriage, offered delivery in 24 months.

Cleveland Plant Acquired.—The Gary Iron & Steel Co., Cleveland, has been purchased outright by a new corporation, recently organized with a capitalization of $300,000, which is to retain the old name. The officers of the new company are George D. Wick, Youngstown, president; C. S. Bigsby, vice president; and W. A. Kingsley, Youngstown, who has been operating the plant for some time for the benefit of creditors, secretary and treasurer. The intention is to enlarge the business, particularly in the manufacture of iron and steel roofing, conductor pipe and trough and paint. The plant acquired is a good condition and well equipped.

A special meeting of the stockholders of the Westinghouse Machine Co. has been called for Dec. 23 to consider the advisability of increasing the capital stock from $5,000,000 to $10,000,000 in order to accommodate the great increase in steam turbine and gas engine business.

A COMBINATION OIL BURNER.

Tate, Jones & Co., Pittsburg, make the combination oil burner illustrated herewith.

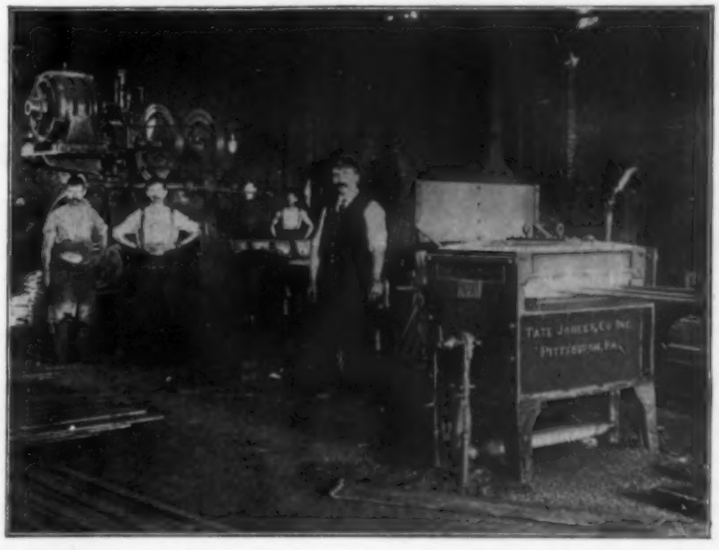
Actual tests have demonstrated that oil burned under high pressure (5 to 20 pounds) is 20 percent more efficient than when burned under low pressure (four ounces to one pound). While a very small amount of air is required to atomize the oil, a much larger amount is required for combustion, and where compressed air for both atomization and combustion have to be supplied to a burner, the expense for large compressors, large amount of power for their operation, etc., have prevented advantage being taken of the more efficient high pressure system. With this combination burner it is claimed only one-tenth of the usual amount of compressed air is required for atomization, and the necessary air for combustion is supplied by a blast fan at three to four ounces, which is inexpensive to purchase and requires very little power to operate and a more complete regulation of the fire can be obtained.

COMBINATION OIL BURNER.

While the heavy oils, such as crude Texas or California oils contain more heat units than the light oils, they cannot be atomized with a low pressure burner. This burner makes the use of these oils economical and further increases the efficiency and advantage of a high pressure system.

On this burner, both compressed air and oil is controlled by one lever, and is adjusted so that the proper proportion of compressed air and oil is always right for atomization. This adjustment cannot be changed, and the burner, therefore, always perfectly atomizes. The supply of air is regulated by a gate on the blast pipe.

Dry steam fed to the burners at the same pressure as the oil may be used for atomizing and as only enough steam is used to break up the oil the burner is noiseless and the amount of steam used very small. It is not as efficient, however, as air. It can be recommended though for low heats, such as for annealing and tempering. If steam is used it is necessary to place a reducing valve in the steam line in order to keep the steam pressure at the burner below 20 20 pounds.



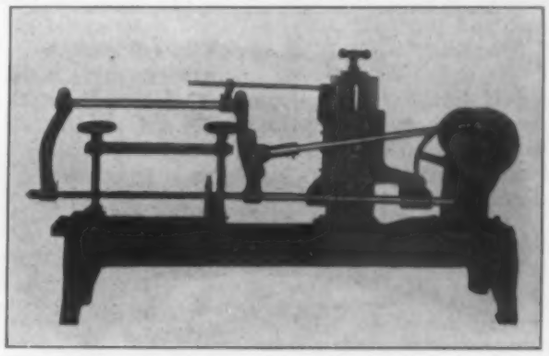
FURNACES EQUIPPED WITH COMBINATION OIL BURNERS, IN RAMAPO IRON WORKS.

The furnaces above illustrated, as well as many others in the plant of the Ramapo Iron Works, are equipped with this combination burner which has effected a large saving in the oil burned.

The company also manufactures burners, oil pumping systems, etc., for all classes of work, and also fits up land and marine boilers.

THE ROBERTSON RAPID CUT POWER SAW.

The power hack saw shown in the accompanying illustration is made by the Robertson Mfg. Co., Buffalo, N. Y. It is designated as a rapid cut power saw, and is made in a number of different sizes. The one shown in the illustration is designed for cutting structural sections up to 15 in. in size. Its capacity for square stock is 8 x 15 in. The saw blade is 24 in. in length and the machine is back geared. The speed is 120 revolutions per minute. The machine fills the demand for a power saw that will cut hard and soft metal, pipe, etc., with accuracy and the greatest economy of blades.



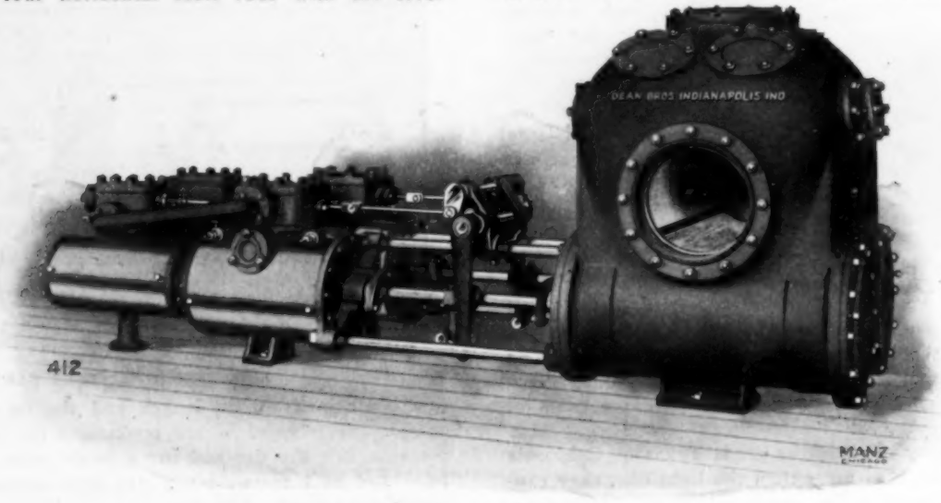
ROBERTSON POWER HACK SAW.

It is neat and compact in design, occupying a very small space. The machine cuts on the forward or push stroke and is light on the return. It has a swinging frame with bearings for supporting the saw frame. This is hinged in the housing of the head casting at the rear by a ¾ in. stud in a long milled bearing, forming an eccentric to the crank shaft, which positively raises the saw frame on the return stroke, relieving the drag on the point of teeth. The machine is provided with a gravity feed, which can be operated so as to increase or decrease the pressure on the saw blade by moving the weight. The blade adjustment is provided for at both ends. Each machine is provided with a quick-acting clutch. In operation after the work has been secured in the vise the frame is lowered and extended to full stroke, the starting lever is then pulled and the saw starts. When the cut is completed the automatic stop acts and trips the clutch. The saw is made in five sizes, the smallest taking stock up to 4 x 4 in., the largest being shown here.

The chief of engineers of the War Department has approved the specifications for the construction of dam No. 13 on the Ohio river and bids for this work will be called for at an early date. Bids will also be asked in the near future for work on the harbor entrance at Tarrytown, New York, for which the sum of $10,000 is available.

A COMPOUND DUPLEX WATER SUPPLY PUMP.

The Dean Brothers Steam Pump Works, Indianapolis, Ind., has recently placed on the market a new compound duplex water supply pump, shown in the accompanying illustration. The pump is designed for pumping large quantities of water to a moderate elevation or pressure, with an economical expenditure of steam. The frame is made up of four horizontal steel rods with the lever housings supported on the upper rods. The two water cylinders are a one-piece casting, by which means the number of joints have been reduced to a minimum. Ready access is obtained to all valves by means of large hand holes situated at convenient points. Water entering the pump is thoroughly strained by means of a large brass strainer placed in the suction opening. The strainer may be removed for cleaning by taking off the plate on the opposite side of the cylinder, which allows the strainer to be withdrawn. The cylinders are brass lined and the piston rods are of brass. The water pistons are inside packed with renewable square packing.



A COMPOUND DUPLEX WATER SUPPLY PUMP.

Gold Medal for the "Long Arm" System.

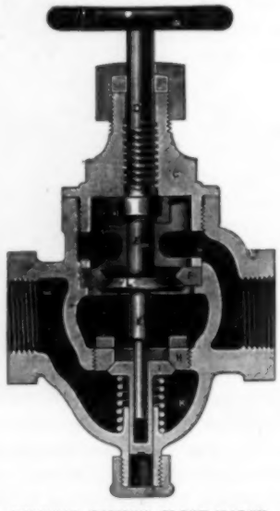
It is announced from London that The "Long-Arm" System Co., of Cleveland, has been awarded a gold medal for its Earl's Court exhibit of "Long-Arm" electrically operated power doors for ships. This was one of the few displays of American devices in the naval, shipping and fisheries exhibit. The exhibit of this system, by which bulkhead doors are closed from a central station in time of an emergency, has attracted the favorable attention of many European naval experts. Foreign admiralties are investigating it with a view to its adoption, following the example of the American navy, which has installed the "Long-Arm" system on thirty-two of our ships. The development of automatic bulkhead doors has been effected wholly within the United States navy. Francis T. Bowles, formerly chief constructor, first conceived the idea of an electrical apparatus for operating these doors. Another graduate of the Naval Academy, W. B. Cowles, perfected the idea into the practical system now in use.

A New Blowing Engine has been installed at the Hudson Iron Co.'s Secaucus furnace. As soon as the difficulty of securing a sufficient supply of ore is met the capacity will be greatly increased. It is expected that ore from the company's own mines will be in the stock house within six weeks.

THE PHILLIP DOUBLE GLOBE VALVE.

The accompanying illustration shows the Phillip double globe valve which is manufactured by the Engineers' Supply Co., of Buffalo, N. Y. The maker states that this valve can be repaired while under pressure thereby avoiding the necessity of placing an extra stop valve on a pipe or shutting down the auxiliaries of the machinery in order to make repairs in the valve controlling them.

The pressure enters underneath the side of the valve I, and together with the spring K keeps the valve closed so that the bonnet C, the valve E and valve seat F can be removed under pressure. The valve E and the seat F can be reground or renewed in a solid brass type or a new soft metal disc may be put on E at L in the disc type of valve. The valve I and the seat H are made of hard blocks and can be reground without moving them from the body. The valve seat F has a ground joint on the body and is held in position by the bonnet C. The spindle D is threaded with a left hand thread so that the valve travels down in opening and allows the gases to pass around and through them both in the chamber. Between the two valves there is a small valve tapped into the body so as to relieve any pressure that may accumulate before removing the bonnet C. The valve is extra heavy in all its parts and does not occupy any more space than the ordinary straight way valve.



PHILLIP DOUBLE GLOBE VALVE.

NEWS FROM MANY INDUSTRIES.

New Buyers :—

The Cast Steel Needle Beam Co., St. Louis, Mo., has been incorporated to manufacture truss rod beams for railroad cars, etc. The capital stock is $100,000.

The New York Engineering Co., Boston, Mass., has been incorporated to carry on a general foundry business, with a capital of $10,000. The president and treasurer is A. F. Bremer, Boston.

The Ohio Steel Furniture Co., Youngstown, O., has been incorporated with $100,000 capital stock. The incorporators are: S. S. Conroy, J. V. Murphy, G. J. Vetter, Henry Dietz and J. F. Giering.

The Nelson-Conrad Co., Chicago, has been incorporated with $2,500 capital stock to manufacture machinery. The incorporators are: Francis E. Matthews, Hal E. Bangs and Ernest Hausberg.

The Fostoria Sheet Metal Co., Fostoria, O., has been incorporated with $10,000 capital stock. The incorporators are: Mahlon M. Car, Jacob S. Baumbaugh, J. W. Skeeley; J. S. Lindower and S. C. Sharp.

The Federal Steel Fixture Co., Chicago, has been incorporated with $10,000 capital stock, to manufacture metal fixtures. The incorporators are: John L. Cartwright, Vincent R. Wilson, Harry A. Vernon.

The Continental Co., Detroit, Mich., has been incorporated to manufacture and deal in wire goods. The new company has an authorized capital stock of $200,000 all of which is subscribed and $100,000 paid in in cash.

The Connersville Wheel Co., Connersville, Ind., has been incorporated with $100,000 capital stock. The directors are: Edward W. Ansted, George W. Ansted, Charles C. Hull, James M. Heron and W. J. Harris.

The Boyer-Radford & Gordon Tank & Pump Co., Dayton, O., has been incorporated with $40,000 capital stock. The incorporators are: Horace S. Gordon, Alvin E. Gordon, E. C. Boyer, Frank Radford and Maurice Costello.

The Ross Bros. Co., Worcester, Mass., has been incorporated to deal in agricultural tools, etc. The capital stock is $75,000. The officers are: President and treasurer, Walter D. Ross, and clerk, Clifford T. Eldridge, both of Worcester.

The Gravity Car Coupler Co., Springfield, Ill., has been incorporated with $10,000 capital stock. The incorporators are: John I. Rinaker Jr., John I. Rinaker and Thomas Rinaker. The company will manufacture machinery and implements.

The D. J. June Machinery Co., Waco, Tex., has been incorporated with a capital stock of $30,000 to transact a manufacturing and mining business. The incorporators are: Benjamin F. Lowery, George A. Clark, both of Waco; and O. S. French, Fremont, O.

The Coles Tool & Machine Co., Oneida, N. Y., has been incorporated to manufacture machinery and tools. The capital stock is $10.000 and the incorporators are: Theodore and Francis N. Coles, James B. Backer, Willard H. Backer and Willard E. Stone, all of Oneida, N. Y.

The Corochain Co., Philmont, N. Y., recently incorporated, will manufacture machinery for making paper. The capital stock is $100,000, and the incorporators are B. I. Houghton, Fred Lampman and G. L. Putnam, Philmont, N. Y.; and L. Miller and F. J. Collier, Hudson, N. Y.

The New Globe Electric Manufacturing Co., Amsterdam, N. Y., has been incorporated to manufacture and acquire all kinds of electrical and mechanical apparatus. The capital stock is $250,000, and the directors of the company are Roy W. Brown, George B. Herrick, John E. Larrabee, Richard Murphy, Waldimir C. Shaufler, all of Amsterdam, and Eugene Moore, and Frank D. Oliver, Johnstown, N. Y.

The Krause Machine Importing Co., New York, has secured articles of incorporation to manufacture engines, boilers, machinery, etc. The capital stock is $10,000, and the incorporators are Hans Hinze, No. 8,783 Bay Sixteenth street, Bath Beach; George A. Voss and Theodore C. Weygandt, both of Brooklyn, N. Y.

The New York Die Co., Oswego, N. Y., has been incorporated as a firm of mechanical and electrical engineers, die makers, and tool makers. The capital stock is $25,000 and the incorporators are Lewis J. Doolittle and Howard W. Forsythe, both of No. 27 Pine street, New York, and William A. Babson, of South Orange, N. J.

The Middletown Chain Co., Middletown, Pa., has been incorporated with the following officers; president J. W. Rewalt; secretary, H. A. Clark; and treasurer, H. H. Shellenberger. The company has bought the foundry built by the Champion Novelty Co., and will manufacture chains by the J. C. Little machine. It will begin work this month.

The American Auxiliary Marine Engine Corporation has been granted articles of incorporation in Massachusetts to acquire letters patent. The capital stock is $250,000, and the officers are president, G. D. Keyser, Salt Lake City, Utah; treasurer, W. M. Gould, No. 16 Russell road, West Somerville, Mass., and clerk, G. D. Schell, No. 39 Perkins hill, Cambridge, Mass.

The Scott National Radiator Co., Marion, Ind., has been incorporated with $25,000 capital stock to manufacture stoves. It has leased buildings belonging to the Bessemer Gas Engine Co. and will commence operations within a week. It is possible that during the year a foundry will be erected. The officers of the company are: Rev. Elwood Scott, president; Dennis Haisley, vice president; Elmer R. Scott, secretary; and Robert Smith, business manager.

New Construction:—

Hopler Brothers, Nauright, N. J., are building a foundry for the manufacture of steam boilers.

The Phillips Sheet & Tin Plate Co. will expend about $20,000 in improvements at its plant at Clarksburg, Tenn.

The Dain Mfg. Co., Ottumwa, Iowa, is building a large addition to its foundry plant and making other extensive improvements.

The Manogus & Pidgeon Iron Co., Memphis, Tenn., will erect a corrugated iron building 50 x 200 ft. to be used as a warehouse.

The Norfolk & Western Railway has plans prepared for the construction of a great steel pier at Fayetteville, Tenn., to cost $1,000,000.

The Taylor Iron & Steel Co., Newark, N, J., is to build a large extension to its steel foundry works and is adding a new building for the storage of patterns.

The Hayes Mfg., Co., Detroit, has its new factory ready for occupancy. The main building is 100 x 200 ft. and the other completed structure is 150 x 100 ft.

The Elk Rapids Iron Co., Elk Rapids, Mich., is to construct six charcoal kilns. It has been necessary for some time past to secure considerable material elsewhere.

John F. Deal & Sons, proprietors of the Enterprise Iron & Wire Works, Baltimore, have purchased a site on Montford avenue upon which they will erect a wire factory.

The Cascade Coal & Coke Co., Tyler, Pa., is building 200 additional coke ovens and intends erecting a new coal washing plant in the near future. The Tyler coke, which has been used

by the Buffalo & Susquehanna Iron Co., Buffalo, N. Y., runs from 88 to 89 percent of fixed carbon with less than one percent of sulphur.

Ground has been broken for the new butweld furnace at the tube department of the Wheeling Iron & Steel Works, Wheeling, W. Va. New gas producers will be required.

The Western Foundry Co., Chicago, has purchased a tract of almost six acres at Thirty-seventh street and Spalding avenue, and will erect a new foundry addition to its plant 150 x 250 ft.

The Cambria Steel Co. has purchased a lot in Johnstown Pa., adjacent to that on which its general offices formerly stood and the report is that a new general office building will soon be erected.

The Standard Sanitary Mfg. Co., Detroit, Mich., has under way a large new plant on Clark avenue where it will shortly remove. The building for the manufacture of sheet steel bath tubs is complete.

The Toledo-Massillon Bridge Co., Toledo, O., has let the contract for the construction of its new plant to the M. Rabbitt & Sons Co., Toledo, O. It will cost about $40,000 and will probably be completed by spring.

The Northwestern Malleable Iron Works, Chicago, has secured a permit for the erection of a new office building three-stories high, at 766 Park street, to cost $16,000.

The Pressed Steel Pole Co., Pittsburg, is erecting a plant 50 x 200 ft. on a site recently acquired at Mount Pleasant, Pa. The A. Garrison Foundry Co. has the contract for the machinery equipment. It is expected that 300 poles a day can be turned out.

Work is being pushed on the new buildings of the Peoria Steel & Tool Co., East Peoria, Ill. The company, however, may not carry out its original plans to manufacture steel for vises and other purposes, but may lease the plant to some other concern.

At the Monongahela blast furnaces of the National Tube Co., a new viaduct is to be constructed from the Pennsylvania railroad bridge at Riverton directly into the yards in front of the furnaces. This will provide much better facilities for the handling of ore and other materials.

The Kalamazoo Railway Supply Co., Kalamazoo, Mich., has broken ground for an addition 60 x 180 ft. to its factory. Machinery to cost $25,000 will be installed. The company recently increased its capital stock from $75,000 to $150,000 and added pressed steel wheels to its list of manufactures.

The Southern Machine Works, High Point, N. C., now engaged in the manufacture and repair of machinery, will carry a full line of mill supplies. A new building, 30 x 60 ft. has been erected and a large part of the equipment has already been installed. G. H. Wilson and J. H. Burns are the proprietors.

The Kilby Frog & Switch Co., Birmingham, Ala., is erecting a plant at North Birmingham for the manufacture of frogs, switches, crossings and other railway equipment. Electricity will be used for operating the plant, equipment for which has already been purchased.

Roy H. Rainey and Paul J. Rainey of New York have purchased from Joseph V. Thompson 1,300 acres of coal lands in the central part of the Connellsville region for $1,500,000. The property is in Redstone township, Fayette county, Pa. The plan of the Rainey company is to erect two coking plants of 650 ovens each, with houses for the employes.

The Geneva Foundry & Machine Co., Geneva, Ill., has begun the erection of a one-story building, 50 x 100 ft. The order for new machinery has not been placed. At a recent meeting of the company the following officers were elected: President, H. B. Fargo; vice president, Gus Soderstrom; treasurer, John T. Peterson; secretary, Frank Channon.

The Pothoff & Frey Iron Co., Cincinnati, will erect a new plant on a site recently acquired at Front and Harriet streets. The new construction will comprise the main building 92x 188 ft. of steel and brick construction, an office and drafting building 25 x 75 ft. and a power plant building. The company will be in the market for machinery in the near future.

The Bissell Chilled Plow Works, South Bend, Ind., has been purchased by the Ohio Cultivator Co., Bellevue, O. A foundry 80 x 300 ft. now almost completed, is to be equipped with all modern appliances and with furnaces which will enable the company to turn out its own malleables. Further improvements will be made in the grinding and polishing room.

The Foos Gas Engine Co., Springfield, O., finds its plant so overtaxed with orders that a further addition is under consideration. The Foos engine was awarded a gold medal as the best single-cylinder horizontal gas engine exhibited at the Portland exposition. It has taken a medal at every exposition where it has been shown and at many state fairs as well.

The North Birmingham Forge Co., North Birmingham, Ala., whose incorporation was mentioned in our issue of Aug. 17, has completed the erection of an iron frame building, 125 x 125 ft. and a power house 25 x 70 ft. The company has booked a number of orders for turnbuckles, cable car grips, thumb screws, valve stems, etc. The officers of the company are: President J. H. Minge Jr.; secretary, J. W. Sloss, and manager, W. E. Nichols.

Fires:—

The iron foundry of the Fred Barker Co., Paterson, N. J., was destroyed Oct. 27 by fire supposed to have originated in a defective flue in the core oven.

The Michigan Malleable Iron Co., Delray, Mich., sustained a loss of about $50,000 by fire Oct. 29. This, however, did not necessitate closing the plant.

The Phoenix-Porter Foundry, North Salina street, Syracuse, N. Y., operated by the Smith & Caffery Co., was visited by fire on Oct. 29. Loss about $1,500.

The Charles E. Hanika Architectural Iron Works, Muncie, Ind., sustained a considerable loss in a fire Oct. 26, which partially destroyed the main foundry building containing valuable machinery and patterns.

The foundry of Davis & Farnham, Waltham, Mass., sustained a loss of $10,000 by fire Oct. 27. The blaze started in the molding room, the greatest damage being to patterns, stock and work in process of completion.

The plant of the Utah Fuel Co., Sunnyside, Utah, was recently visited by fire, and as a result coke will be scarce in that section for some time. The Montana Coal & Coke Co., however, is preparing to double its output.

In a fire which occurred in Rochester, Oct. 20, the property of the Genesee Tack Co. and of the Glazier Headlight Co. suffered a loss estimated to be between $25,000 and $30,000. Much valuable machinery not actually destroyed was seriously damaged by water and smoke.

General Industrial Notes:—

Hanchett & Son are removing their machine shop from Chicago to Big Rapids, Mich.

The annual convention of the American Federation of labor will be held at Pittsburg, beginning Nov. 13.

The Harrisburg Pipe & Pipe Bending Co., has started up its new 36-inch blooming mill at Harrisburg, Pa.

The Pennsylvania railroad evidently believes that the steel tie is not to replace the wooden tie in the near future, as it is now planting 600,000 locust trees on its properties along the Susquehanna and Juniata rivers. In the last two years it has set about 800,000 trees.

The Maryland Rail Co., Cumberland, has gone on double turn and increase its product to 1,400 tons of rails per day.

The Harriman Mfg. Co., a New Jersey corporation with its principal offices in Harriman, Tenn., has purchased the

properties of the Harriman Plow & Handle Co. and the Harriman Ice & Coal Co. of that place.

The Lone Star Culvert Co., Houston, Texas, has begun the manufacture of corrugated iron culverts for railroad and wagon road use.

C. R. Herrick has purchased the plant and business of the Lyons Engine Co., Lyons, Mich. The company manufactures gasoline engines.

The Fairbanks Steam Shovel Co., Marion, O., has closed a deal whereby it occupies the old Stroebel works as offices and drafting rooms.

L. J. Dame, 314 Salmon street, Portland, Ore., is in the market for machinery for the manufacture of wood alcohol and kindred products.

The Landis Machine Co., Waynesboro, Pa., will hold a meeting Dec. 14 to vote on a proposed increase of capital stock from $50,000 to $100,000.

The American mill of the National Tube Co. started two additional furnaces last week adding over 150 men to the roll of the plant at Middletown, Pa.

Improvements to cost a quarter of a million are under consideration by officials and directors of the Maryland Steel Co. The plant is at Sparrow's Point, Md.

Consul-general Miller of Yokahama reports the concession to Sir John Lister Kaye of Chinese ore deposits with more than 6,000,000 tons of ore in sight.

The Anniston, Ala., plant of the Western Steel Car & Foundry Co. is being put in readiness for operation. The malleable iron foundry of the plant resumed Nov. 1.

The Manufacturers' Record has removed its editorial and business offices to its new location in the Merchants' National Bank Building, Baltimore, occupying the entire second floor.

Several large buildings including shearing and punching machinery and a power hammer for forging and plating have been added to the Brown-Manly Plow Co., Malta, O.

The Central Iron & Steel Co., Harrisburg, Pa., broke all previous records last week when its No. 1 and No. 2 plate mills and universal mill turned out 3,478 tons of steel plates.

The Pennsylvania Steel Co. is making extensive additions to the boilers and ovens of its Steelton, Pa., furnaces. The company has been making a big product this summer.

Formal action has been taken in the consolidation of the West Virginia Bridge & Construction Co., and the New Jersey Bridge Co., under the title of the New Jersey & West Virginia Bridge Co. The capitalization of the combine is $500,000.

During October the two rail mills of the Edgar Thomson Steel Works of the Carnegie Steel Co. at Braddock, Pa., broke all records for a month's production of steel rails. The total tonnage was 83,117.

The Bessemer & Lake Erie Railroad has already broken all records in ore tonnage for one year. Last year it handled 4,087,000 tons from the lakes, while this year up to Nov. 1 the business carried was 4,400,000 tons.

The G. H. Curtiss Mfg. Co., Hammondsport, N. Y., the incorporation of which was recently noted, was the builder of Capt. Baldwin's air ship motors and of the motors used by Benbow, Knabenshue, Stevens and others.

The Warwick Iron & Steel Co. has awarded a contract for a bridge over 600 feet long to span the Schuylkill river at Pottstown to Focht & Missemer. Work has been started on the structure, which is to transport cinder cars, the company having bought land for its dump across the river from the furnaces.

Attorney-General Rogers of Arkansas, has brought two suits against the International Harvester Co. and the International Harvester Co. of America, to collect penalties aggregating $1,770,000, under the provisions of the Arkansas anti-trust laws. The ousting of the company from the state is also asked.

The American Locomotive Co., New York, is turning the boiler shop of its Brooks Works, at Dunkirk, N. Y., into a machine shop, and will erect a building 900 ft. long adjoining the new steel foundry, for use as a boiler shop.

The Embree Iron Co., Embreeville, Tenn., is installing an additional blowing engine of the Allis-Chalmers make together with a Tomlinson Condenser of sufficient capacity to condense steam from all its pumps and engines.

The Warwick Iron Ore Co., 11 Broadway, New York, is pumping the water from the Baker iron mines near Wharton, N. J., which it recently acquired. About 50,000 tons of ore can be gotten out when the work of overhauling is completed.

The Keystone Steel Co., with a capital of $200,000, it is reported, will locate at Sebring, O., where edged tools will be manufactured by a process invented by Richard Jones of Pittsburg. A site has been donated the company as a bonus.

The Citizens' Industrial Association of America will hold its annual convention at St. Louis, Nov. 15 and 16. It was inaugurated two years ago with Mr. D. M. Parry as its first president. C. W. Post is now at the head of the organizaton.

The Morse Brothers Machinery & Supply Co., recently incorporated at Denver, Colo., takes over the business of the S. H. Supply Co., in mining milling and smelting machinery and supplies. The new location is Eighteenth and Lawrence Streets.

Charles M. Schwab has satisfied a mortgage for $10,000,000, given by the United States Shipbuilding Co., to the Colonial Trust Co., of New York, to cover the property of the Bethlehem Steel Co. It was recorded Aug. 12, 1902, in Lehigh county, Pa.

About 49,000 gross tons of steel ingots were turned out by the open hearth plant of the Clairton works of the Carnegie Steel Co. in October. The three blast furnaces at the same plant turned out during the same month about 41,000 tons of pig iron.

Asphaltine, a mixture of tar and iron slag, is being successfully used on the streets of London and Stuttgart, writes Consul General Guenther of Frankfort, Germany. The substance is elastic, tough and durable, looks well and is not affected by bad weather or heavy traffic.

Legal steps for the sale of the plant of the Delaware River Steel Co., at Chester, Pa., are being taken and there are prospects that the plant will be operated. Rumors are also circulating in Eastern Pennsylvania that the Tidewater Steel works at that city may be run this winter.

The Philadelphia & Reading Coal & Iron Co. has decided to pump the water from many of its abandoned colleries near Pottsville, and will further develop its holdings in the lower basin with the idea of increasing its anthracite output.

The plant of the New York Wire & Steel Co. and all its property in Astoria has been sold by referee to Augustus Van Horne Ellis for $80,000. Mr. Ellis was formerly president of the concern and held a judgment against it for $95,752. The plant is said to have cost over a half million.

The International Power Co. announces that it has taken over all of the business of the Amoskeag Fire Engine Co., of Manchester, N. H. The business was acquired by purchase some time ago and had been conducted by the fire engine company under a lease. The lease has now expired and the International Power Co. will enter the field.

The Combination Steel Works, Chester, Pa., has been leased to a syndicate of New York capitalists headed by J. F. Monot and B. E. Eldrad. The mills have been closed for the past three years, previous to that time being operated by the

Chester Steel & Iron Co. A new sheet and bar mill will be installed and operations will be begun as soon as possible.

An exhibition to stimulate native manufacturing enterprises will be held at Barranquilla, Columbia, from Nov. 9 to 13. Machinery suited to mills and mining in the tropics will be shown. Foreign exhibits are in charge of El Secretario de la junta Directivo del Cartamen Aristio Industrial, Barranquilla, Colombia.

Stockholders of the East Tennessee Coal & Iron Co., Knoxville, Tenn., have elected the following officers and directors:—President and treasurer, J. D. Raht; vice president, L. D. Lewis; secretary, H. J. Merwin; and the following directors: J. D. Raht, Col. L. D. Tyson, Col. A. D. Adair, E. Wartenhouse and G. R. Frost.

The Milwauke Coke & Gas Co., Milwaukee, Wis., is planning an increase in capitalization from $1,000,000 to $2,000,000, and during the first half of 1906, will add a group of 80 coke ovens to its Greenfield avenue plant. A battery of 80 ovens now being constructed will be ready for use Jan. 1, when the company will have a capacity of 1,000 tons of coke daily.

A subway 11.5 miles long is to be constructed in Berlin at a cost of over $12,000,000. The cars, which are to be of the American style, will be divided into first and second class compartments. The best lighting, ventilation and exit facilities will be provided, and sufficient power will be installed to enable the trains to make 25 miles an hour.

The American consul at Prague, Austria, has established a bureau of commercial intelligence, classifying catalogs so that they are of easy access to possible purchasers in his territory. Catalogs sent him must contain prices and discount lists, and must have weights and measures reduced to the standards there in use. Reference lists should also be sent.

The Republic Iron & Steel Co., with a view of centralizing its forces, intends to dismantle six iron mills in Indiana. Those included in the list are: the Central Works, Brazil; Indiana and Muncie, Muncie; Terre Haute and Wabash, Terre Haute, and Alexandris, Alexandria. The machinery from the Wabash mill, which has already been torn down, is now offered for sale.

Waterbury, Conn., men have organized the Capitol Foundry which has bought out the iron business of the Standard Foundry Co., Hartford. The latter company, however, will continue its brass business. The officers of the Capitol Company are F. W. Stickle, president and general manager; A. A. Tanner, vice president; William B. Judd, secretary and Frank S. Wilmot, treasurer.

The Rockaway Rolling Mill, Rockaway, N. J., is completing extensive alterations and repairs to the mill which it recently acquired and will begin operations Nov. 13. Six new furnaces are being built, new steel roughing rolls installed, a puddle mill is being completely changed and new machines for shaping the raw materials installed. A modern electric plant is being built and new engines and boilers are being added. These improvements will double the capacity of the plant, which will be about 20,000 tons. The company will operate as an independent mill, turning out refined bar iron with a jobbing and large consuming trade.

Trade Notes:—

The American Bridge Company has been awarded the contract for a $5,137 bridge in Ligonier township by the Westmoreland county Pa., authorities.

Davies & Thomas, Catasaqua, Pa., have been awarded the contract for the castings for the Steinway tunnel under the East river, New York. From 12,000 to 18,000 tons will be required.

The Portage Lake Foundry & Machinery Co., is to fill an order at its Ripley, Mich., plant for 200,000 pounds of castings. Two heavy rock crushers for a large mining company in Utah are included in the order.

The Dominion Coal Co. has contracted with the Canadian Westinghouse Co. for complete installation of electrical apparatus for its mines at Glace Bay, N. S. The contract price is $100,000.

The National Heating Appliance Co., Utica, N. Y., which was recently incorporated, will manufacture the Shoals fuel saving attachments, operating its own plant. The Western office which will carry stock is at Room 621, Roanoke Bldg., Chicago.

The Thomas W. Pangborn Co. is established at 227-229 Fulton street, New York, and will devote exclusively to ware-house purposes its old premises at 42 Day street. Hammers, shakers and riveters are among the company's specialties.

Mexico is a large customer in structurals and steel rails just now. A shipment of 1,500 tons of bridge materials is soon to be made from New York, and the same steamer will carry 4,500 tons of steel rails from the Maryland Steel Co. to the Mexican Central Railway.

The Chandler & Taylor Co., Indianapolis, has recently closed contracts for three Standard service enclosed self-oiling engines for the Michigan Agricultural College at Lansing and one of the same type for the N. Auth Provision Co., Washington, D. C. Three other engines have been sold to an institution at St. Mary's, Ind.

The W. B. Pollock Co., of Youngstown, Ohio, through its Birmingham representative, Solon Jacobs, has sold to the Alabama Consolidated Coal & Iron Co., three new stoves for the Gadsen furnace plant, the stoves to be delivered at once. The Pollock Company is supplying stoves and other machinery for the furnace being rebuilt at Ensley by the Tennessee Coal, Iron & Railroad Co.

The American Shipbuilding Co. is to construct two steel package freight steamers for the Rutland Transit Co. They will be 256 ft. over all, 242 ft. keel, 43 ft. beam and 26 in. depth; equipment will be as modern as can be secured and a speed of thirteen miles loaded will be expected. The boats are to go into commission June 15 next.

Samuel W. Hay's Sons, Pittsburg, have secured the contract to furnish and erect complete equipment for the model foundry at the Carnegie Technical Schools. This contract includes 7-ton Whiting cupola with structural steel charging platform, 2,000 lb. capacity, Whiting foundry elevator with Reynold's chain drive to Westinghouse motor, and No. 6 Sturtevant steel pressure blower with Morse chain drive to 15 H. P. motor.

The Wellman-Seaver-Morgan Co., of Cleveland, Ohio has been awarded by the U. S. Government, the contract for crane service over two ship building berths at the U. S. navy yard at Mare Island, San Francisco. This is one of the most important contracts in this line that has been placed for a long time, comprising an immense steel trestle and a powerful high-speed cantilever gantry crane mounted on same and traversing over the two berths.

The Bucyrus Co., Milwaukee, Wis., is to build for the Panama Canal Commission nineteen 70-ton steam shovels at $10,240 each or a total of $194,560. It will erect the machines, the government furnishing only the necessary unskilled labor. The Allis-Chalmers Co. submitted a net lower bid, but did not propose to pay freight charges or the cost of erecting and testing the machines. The Lidgerwood Mfg. Co., New York City, was given the contract for six 60-ton unloaders at $7,949 each, the Marion Steam Shovel Co., Marion, O., for twelve unloading plows at $900 each, and the Mann & McCann Co., Chicago, for six earth-spreaders at $23,382 for the lot. R. C. Horton, Chicago, is to build three large steel water tanks.